Bendix Guidance Systems Division

FOREWORD

This Final Report is submitted in accordance with the Statement of Work, Exhibit "A" for Contract NAS8-32660. The study was directed from the Guidance Systems Division (GSD) of The Bendix Corporation. The program manager at this location was Mr. Raymond Kaczynski. Contributors from GSD were Mr. Raymond Kaczynski (Sections 1, 3, 5 and 9), Dr. Frederick Chichester (Sections 3 and 4) and the late Dr. Solomon Nachmias who initiated the study in Section 5. Other tasks were completed by personnel from the Bendix Research Laboratories Division (BRL) and the Bendix Energy, Environment and Technology Office (BEETO). The BRL effort, primarily Sections 2, 6 and 7, was coordinated by Mr. William Gelbach. Material in Sections 2 and 6 was generated by Dr. Mike Lodaya, with consultant Dr. Gary Leininger contributing to the basic approach in Section 6. Dr. Robert Gregory provided the material in Section 7. Mr. Don Lipski of BRL was responsible for the programming and some of the vehicle modeling in Sections 2, 4, 6 and 8. Mr. Dan Johnson of BRL was available for some of the mathematical modeling in the first half of the study. Mr. Calvin Rybak and Dr. Rao Karanam of BEETO were responsible for the material presented in Section 8. The guidance of Dr. Michael Borelli of MSFC throughout the study is again gratefully acknowledged.

ABSTRACT

Several approaches for an attitude control system are studied and developed for a large space construction base that is structurally flexible. Digital simulations were obtained using the following techniques: (a) the multivariable Nyquist array method combined with closed loop pole allocation, (b) the linear quadratic regulator method. Equations for the three-axis simulation using the multilevel control method were generated and are presented. Several alternate control approaches are also described. A technique is demonstrated for obtaining the dynamic structural properties of a vehicle which is constructed of two or more submodules of known dynamic characteristics.

THE
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SPACE CONSTRUCTION BASE CONTROL SYSTEM

FINAL REPORT

SEPTEMBER 1, 1979

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SECTION 1

1.0 INTRODUCTION

This report is submitted in compliance with the statement of Work under contract NAS8-32660. The period of performance covered by the report is the calendar year of August 26, 1978 to August 26, 1979. The submission and approval of this report constitute the successful completion of the Exhibit "A" and Exhibit "B" portions of the contract.

This report is the second of a series under the same contract number. The previous report (Reference 1-1) was submitted in October 1978 and covered the period from July 27, 1977 to July 27, 1978 in compliance with Exhibit "A" of contract NAS8-32660.

1.1 OBJECTIVES

The sections that follow summarize the effort expended on the Space Construction Base (SCB) Control System Study contract. The primary objective of the study was to develop a control system and flexible control techniques that will stabilize a large and growing space station of the future. The study emphasized control methods, but additional topics include dynamic modeling of the vehicle and a technique for combining the dynamics of two or more submodules into one overall model.

1.2 SCOPE

Study effort was concentrated in two major areas:

a. Application of different methods for control of large flexible spacecraft.

b. Generation of flexible vehicle dynamic models.

Control equations were developed for three distinct approaches:

a. Multilevel control
b. Linear quadratic regulator (LQR)
c. Multivariable Nyquist array (MNA) method and Pole Placement Techniques.

Single axis simulations were generated for control of the SCB Configuration 1 using the LQR and MNA techniques. Control equations were generated for three-axis control of the same vehicle using the Multilevel control method. A heavy programming load resulting from one of the vehicle modeling tasks pre-empted the completion of this three-axis multilevel control simulation.

Equations were generated for this three-axis vehicle model and are presented along with control equations for the multilevel approach. Single axis vehicle models also were derived for application with the other control approach simulations. One additional vehicle modeling task was a structural analysis study in which the dynamic models of two submodules were combined to form a single structural model. Vibration modes for the individual submodules and those for the composite structure were obtained using computerized matrix techniques for finite elements of the bodies. Analytical techniques also were applied to verify the results.

Some assumptions used throughout the report are that sensor and actuator dynamics are negligible in the control analysis because of their relatively broad bandwidths, computer quantization and other non-linearities were assumed to be negligible for the time being.

A number of other items related to SCB control are not discussed here since they were completed in the previous study (Reference 1-1):

a. Mission requirements
b. Pointing and orientation requirements
c. Actuator sizing requirements
d. Momentum desaturation requirements.

1.3 GENERAL

This report is comprised of nine sections. Section 2 contains an SCB vehicle model (Configuration 1), which is used in Section 4 in equation form and in Section 6 as numerical data. Sections 3 through 7 treat control techniques for attitude stabilization of flexible vehicles. Section 3 contains a preliminary description of each of the control techniques utilized in Sections 4, 5 and 6. Section 4 describes equations for three axis simulation of the multilevel control method. Section 5 presents a single axis simulation of control using the linear quadratic regulator (LQR) method. Section 6 describes a simulation of one axis of the SCB using the multivariable Nyquist array (MNA) method of control, and also applies a technique for closed loop pole placement. Section 7 discusses several alternate control approaches

which may be considered in future efforts. Section 8 treats a potentially important tool for flexible vehicle modeling: a structural analysis study for combining the dynamics of two or more distributed parameter submodules into a single model when the submodules are securely fastened together. Section 9 is a discussion of conclusions and recommendations. A number of Appendices are placed at the end of the report. References are cited liberally and are listed at the end of each section.

The original RFQ requested that the International System of units (designated as SI) be used in the program and in any reporting. Torques, moments, angular momentum, moments of inertia and distances, however, are stated in English units since this was the system of units used in presenting all of the vehicle inertia data in the RFQ.

A liberal approach was also followed in the numbering of SCB configurations. The original RFQ initially used Roman numerals, but the text here used Arabic numerals in most cases -- except where material is reprinted from the RFQ.

1.4 REFERENCES

1-1 Guidance Systems Division, The Bendix Corporation, Space Construction Base Control System, Final Report, Contract NAS8-32660 for Geroge C. Marshall Space Flight Center, Oct. 27, 1979.

SECTION 2

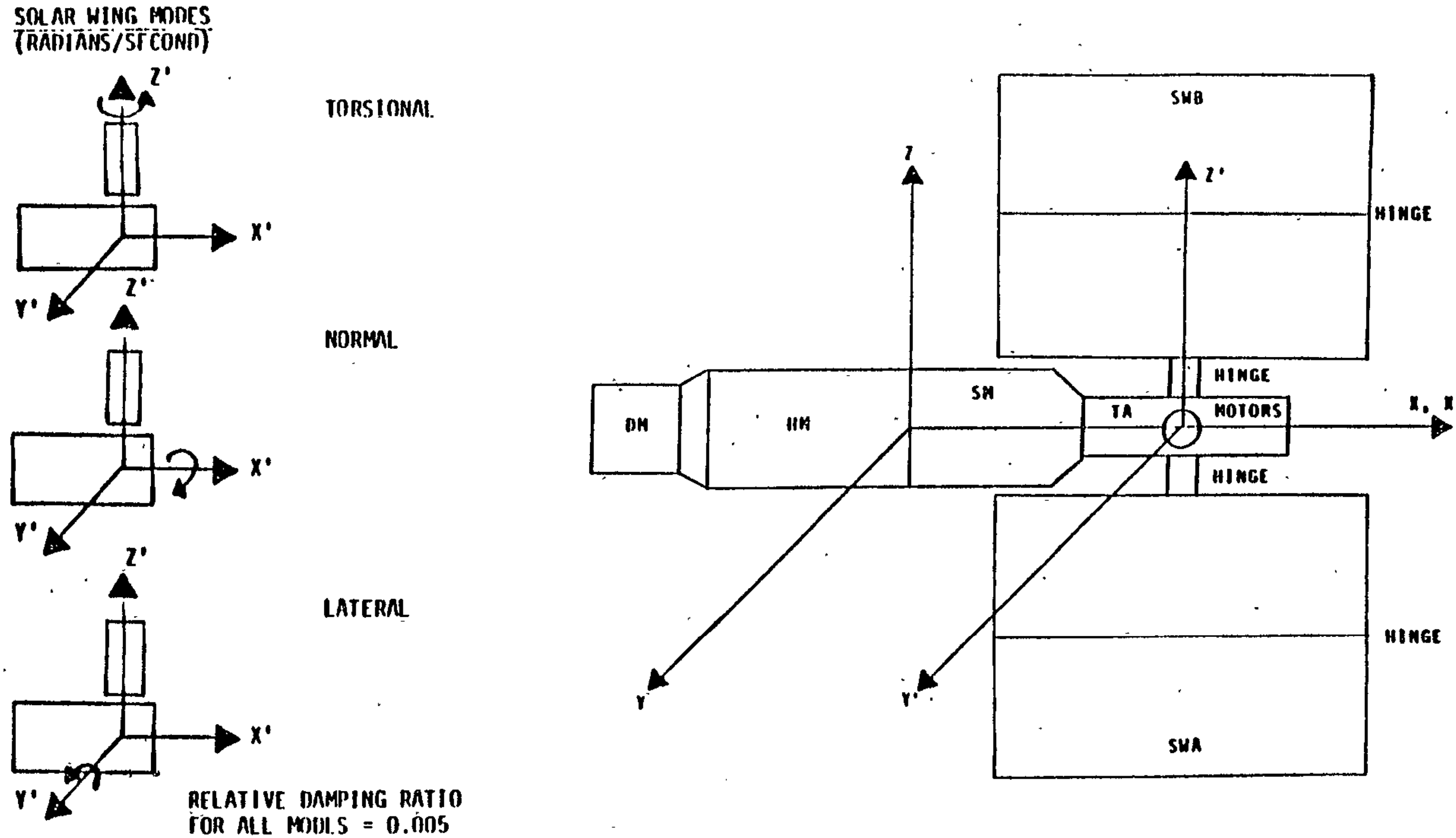
SECTION 2

2.0 DYNAMIC MODELING OF THE VEHICLE

Configuration 1 of the SCB consists of two solar wings connected to four contiguous modules which are considered to be rigid relative to the solar wings. Each solar wing is converted to two rigid bodies as shown in Figure 2-1. The five individual bodies are designated as in the diagram of Figure 2-2. They are connected to each other via the three degree of freedom hinge suspensions, designated as 2 through 5 as shown.

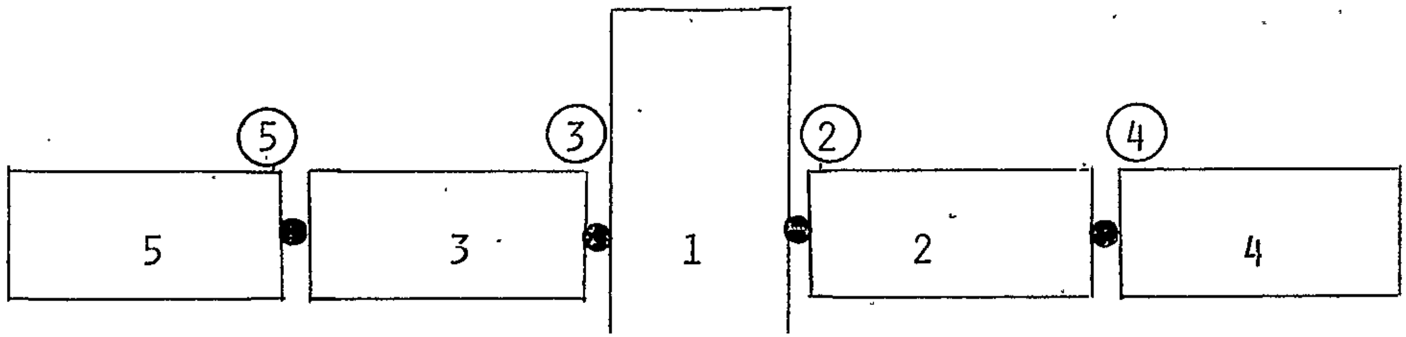
2.1 MATHEMATICAL MODEL

The mathematical model for the SCB Configuration 1 spacecraft was obtained using the discrete coordinate method described in Reference 2-1. The system model consists of five rigid bodies connected by joints or hinges and subjected to arbitrary external forces and torques. The modeling procedure assumes that the bodies are connected in the form of a topological tree and hence contains no "closed loops". The relative motion about each joint is assumed to be rotational, and a three axis model which includes all cross-coupled axis interactions was developed.



CONFIGURATION 1 OF SPACE CONSTRUCTION BASE

FIGURE 2-1



(The individual bodies are connected to each other via three degree of freedom spring hinge suspensions. Hinge numbers are circled.)

TOPOLOGICAL DIAGRAM OF SCB CONFIGURATION 1
FIGURE 2-2

The linearized model, derived based on small relative assumptions using the discrete coordinate approach (References 2-2 and 2-3), is expressible in the form.

$$P\dot{\omega} = Q \tag{2-1}$$

where: P is 15 x 15 nonsingular matrix, function of the model parameters (inertias, masses, etc.)

ω is 15 x 1 angular velocity vector, defined as

$$\omega = \left[\omega_{1X}, \omega_{1Y}, \omega_{1Z}, \omega_{2X}, \omega_{2Y}, \omega_{2Z}, \omega_{3X}, \omega_{3Y}, \omega_{3Z}, \omega_{4X}, \omega_{4Y}, \omega_{4Z}, \omega_{5X}, \omega_{5Y}, \omega_{5Z}\right]^T$$

Q is 15 x 1 torque vector,

defined as:

$$Q = \left[Q_1, Q_2, Q_3, Q_4, Q_5\right]^T \text{ and}$$

$$Q_i = (Q_{ix}, Q_{iy}, Q_{iz})^T \text{ for } i=1,\ldots,5$$

The vector components of the Matrix Q are given as follows:

$$
\begin{aligned}
Q_1 &= T_{e_1} + T_{a_1} - T_{S_{12}} - T_{S_{13}} \\
Q_2 &= T_{e_2} + T_{a_2} + T_{S_{12}} - T_{S_{24}} \\
Q_3 &= T_{e_3} + T_{a_3} + T_{S_{13}} - T_{S_{35}} \\
Q_4 &= T_{e_4} + T_{a_4} + T_{S_{24}} \\
Q_5 &= T_{e_5} + T_{a_5} + T_{S_{35}}
\end{aligned}
\tag{2-2}
$$

where T_{e_i} is an external torque vector on body i given by $T_{e_i} = (T_{e_{iX}}, T_{e_{iY}}, T_{e_{iZ}})^T$

T_{a_i} is an actuator, torque vector on body i given as $T_{a_i} = (T_{a_{iX}}, T_{a_{iY}}, T_{a_{iZ}})^T$

$T_{S_{ij}}$ is a suspension torque vector between bodies i and j given as

$$T_{S_{ij}} = (T_{S_{ijX}}, T_{S_{ijY}}, T_{S_{ijZ}})^T$$

Define thirty state variables as follows:

$$X_1 = \omega_{1X} \qquad X_2 = \omega_{1Y} \qquad X_3 = \omega_{1Z} \tag{2-3}$$

$$X_4 = \omega_{2X} - \omega_{1X} \qquad X_5 = \omega_{2Y} - \omega_{1Y} \qquad X_6 = \omega_{2Z} - \omega_{1Z} \tag{2-4}$$

$$X_7 = \omega_{3X} - \omega_{1X} \qquad X_8 = \omega_{3Y} - \omega_{1Y} \qquad X_9 = \omega_{3Z} - \omega_{1Z} \tag{2-5}$$

$$X_{10} = \omega_{4X} - \omega_{2X} \qquad X_{11} = \omega_{4Y} - \omega_{2Y} \qquad X_{12} = \omega_{4Z} - \omega_{2Z} \tag{2-6}$$

$$X_{13} = \omega_{5X} - \omega_{3X} \qquad X_{14} = \omega_{5Y} - \omega_{3Y} \qquad X_{15} = \omega_{5Z} - \omega_{3Z} \tag{2-7}$$

$$X_{16} = \phi_1 \qquad X_{17} = \theta_1 \qquad X_{18} = \psi_1 \tag{2-8}$$

$$X_{19} = \phi_2 - \phi_1 \qquad X_{20} = \theta_2 - \theta_1 \qquad X_{21} = \psi_2 - \psi_1 \tag{2-9}$$

$$X_{22} = \phi_3 - \phi_1 \qquad X_{23} = \theta_3 - \theta_1 \qquad X_{24} = \psi_3 - \psi_1 \tag{2-10}$$

$$X_{25} = \phi_4 - \phi_2 \qquad X_{26} = \theta_4 - \theta_2 \qquad X_{27} = \psi_4 - \psi_2 \tag{2-11}$$

$$X_{28} = \phi_5 - \phi_3 \qquad X_{29} = \theta_5 - \theta_3 \qquad X_{30} = \psi_5 - \psi_3 \tag{2-12}$$

Where ϕ_i, θ_i, ψ_i are the Euler angles about X, Y and Z axis, respectively, for body i.

$\phi_{ij} = \phi_i - \phi_j$ represents a relative angle of body i with respect to body j in the X direction.

Similarly, $\theta_{ij} = \theta_i - \theta_j$, $\psi_{ij} = \psi_i - \psi_j$, $\omega_{ijx} = \omega_{ix} - \omega_{jx}$, $\omega_{ijy} = \omega_{iy} - \omega_{jy}$ and $\omega_{ijz} = \omega_{iz} - \omega_{jz}$.

Also define:

$$X_{H1} = (X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, X_{14}, X_{15})^T \tag{2-13}$$

$$X_{H2} = (X_{16}, X_{17}, X_{18}, X_{19}, X_{20}, X_{21}, X_{22}, X_{23}, X_{24}, X_{25}, X_{26}, X_{27}, X_{28}, X_{29}, X_{30})^T \tag{2-14}$$

$$X = \begin{bmatrix} X_{H1} \\ X_{H2} \end{bmatrix} = (X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, X_{14}, X_{15}, X_{16}, X_{17}, X_{18}, X_{19}, X_{20}, X_{21}, X_{22}, X_{23}, X_{24}, X_{25}, X_{26}, X_{27}, X_{28}, X_{29}, X_{30})^T \tag{2-15}$$

From the definition of the state variables:

$$\dot{X}_{H2} = X_{H1} \tag{2-16}$$

i.e., $\dot{X}_{16} = X_1$, $\dot{X}_{17} = X_2$, etc.

Equations (2-3) through (2-7) can easily be rearranged so that ω can be expressed in terms of X_{H1} by the following relationship:

$$\omega = N X_{H1} \tag{2-17}$$

Where N is 15 x 15 constant, nonsingular matrix.

Differentiating (2-17) with respect to time yields;

$$\dot{\omega} = N \dot{X}_{H1} \tag{2-18}$$

Multiplying both sides of equation (2-1) by P^{-1} and substituting for angular acceleration vector $\dot{\omega}$ from equation (2-18) yields;

$$N \dot{X}_{H1} = P^{-1} Q \tag{2-19}$$

Multiplying both sides of equation (2-19) by N^{-1} gives;

$$\dot{X}_{H1} = N^{-1} P^{-1} Q \tag{2-20}$$

Assuming no external torques, equation set (2-2) can be written as;

$$Q = T_a + T_S \tag{2-21}$$

where T_a is 15 x 1 actuating torque vector.

T_S is 15 x 1 suspension torque vector, given by:

$$T_S = (-T_{S_{12}} - T_{S_{13}},\ T_{S_{12}} - T_{S_{24}},\ T_{S_{13}} - T_{S_{35}},\ T_{S_{24}},\ T_{S_{35}})^T \tag{2-22}$$

$(-T_{S_{12}} - T_{S_{13}})$, etc., are 3 x 1 vectors.

The scalar suspension torques can be expressed in terms of rate and displacement constants and inertial rate difference and relative displacements, for example:

$$\begin{aligned} T_{S_{12X}} &= - K_{S_{12X}} \phi_{21} - C_{S_{12X}} (\omega_{2X} - \omega_{1X}) \\ T_{S_{12Y}} &= - K_{S_{12Y}} \theta_{21} - C_{S_{12Y}} (\omega_{2Y} - \omega_{1Y}) \\ &\vdots \\ T_{S_{35Z}} &= - K_{S_{35Z}} \psi_{53} - C_{S_{35Z}} (\omega_{5Z} - \omega_{3Z}) \end{aligned} \tag{2-23}$$

Substituting equation set (2-23)for all scalar suspension torques in (2-22), using definitions of the state variables (2-3 through 2-12) and re-arranging the terms, equation (2-22) can be expressed as

$$T_s = KD\, X_{H1} + KS\, X_{H2} \tag{2-24}$$

where KD is 15 x 15 matrix of damping constants and KS is 15 x 15 stiffness matrix.

Substituting (2-24), into (2-21) gives

$$Q = T_a + KD\, X_{H1} + KS\, X_{H2} \tag{2-25}$$

substituting Q given by (2-25) into (2-20) and multiplying by N^{-1} yields;

$$\dot{X}_{h1} = N^{-1}\, P^{-1} \left[T_a + KD\, X_{H1} + KS\, X_{H2} \right] \tag{2-26}$$

Rewriting (2-16) in the following form:

$$\dot{X}_{H2} = I\, X_{H1} + 0\, X_{H2} \tag{2-27}$$

where I is 15x15 identity matrix
and 0 is 15x15 null matrix.
Combining (2-26) and (2-27) Yields

$$\begin{bmatrix} \dot{X}_{H1} \\ \dot{X}_{H2} \end{bmatrix} = \begin{bmatrix} N^{-1}P^{-1}KD & N^{-1}P^{-1}KS \\ I & 0 \end{bmatrix} \begin{bmatrix} X_{H1} \\ X_{H2} \end{bmatrix} + \begin{bmatrix} N^{-1}P^{-1} \\ 0 \end{bmatrix} T_a \tag{2-28}$$

This can be further expressed as:

$$\dot{X}(t) = AX(t) + B\tau(t) \tag{2-29}$$

where $X = \left[X_1, --- X_{30}\right]^T$

$$\tau(t) = T_a = \left[T_{a1x}, T_{a1y}, T_{a1z}, \ldots\ldots, T_{a5z}\right]^T_{15x1}$$

$$A = \begin{bmatrix} N^{-1}P^{-1}KD & N^{-1}P^{-1}KS \\ I & 0 \end{bmatrix}_{30x30}$$

$$B = \begin{bmatrix} N^{-1}P^{-1} \\ 0 \end{bmatrix}_{30x15}$$

Assuming no torque applied to body 4 and 5, τ can be written as

$$\tau = \left[\tau_{1x}, \ldots\ldots, \tau_{3Z}\right]^T_{9 \times 1} \tag{2-30}$$

and B can be reduced to 30x9 matrix.

Numerical values of matrices P, N, KD, KS, A and B used for analysis and design purposes are shown in Appendix A.

2.2 Model Reduction Eigenvalue Analysis

The eigenvalues for the five-body three-axis models were obtained as follows: (Set A)

(1)	-.0149042	$\pm$	j 1.61213
(2)	-.0268672	$\pm$	j 1.20486
(3)	-.0153772	$\pm$	j 0.642112
(4)	-.00228948	$\pm$	j 0.312132
(5)	-.43191	$\pm$	j20.9923
(6)	-.462163	$\pm$	j20.4238
(7)	-.0653141	$\pm$	j 7.13316
(8)	-.0356952	$\pm$	j 5.55713
(9)	-.00502089	$\pm$	j 1.00192
(10)	-.00500057	$\pm$	j 1.00005
(11)	-.00172613	$\pm$	j 0.322123
(12)	-.00160014	$\pm$	j 0.32009

There are also six eigenvalues at the origin.

Setting all cross-axis coupling terms to zero, three five-body single-axis models can be developed. Under this condition the eigenvalues were computed as follows (Set B):

X-axis			Y-axis		
	0.0			0.0	
	0.0			0.0	
-.014904	±	j 1.61213	-.431645	±	j20.989
-.0266921	±	j 1.18467	-.462423	±	j20.427
-.0153771	±	j 0.642111	-.0654125	±	j 7.13772
-.00222516	±	j 0.30449	-.0356052	±	j 5.55064

Z-axis

0.0

0.0

-.00502089 ± j 1.00192

-.00500057 ± j 1.00005

-.00172613 ± j 0.322132

-.00160014 ± j 0.32009

A comparison of the single axis eigenvalues with the three axis eigenvalues leads to the conclusion that, from an eigenvalue assignment viewpoint, the three axis vehicle control system can be subdivided into three single axis control systems. Further comparison suggests that cross-axis coupling from an eigenvalue perspective is minimal, and thus an increase in the damping and/or stiffness factors of the system by active control can be accomplished by single axis measures.

To examine the eigenstructure further, consider the single axis representations of Figure 2-2. The eigenvalues at the origin represent the rigid body dynamics of the main unit while the flexible modes are attributed to the solar wings. If the main unit were

sufficiently larger than the solar wing, the dynamics would not interact. The eigenvalues would then appear in double complex pairs. As the mass of the main unit decreases the eigenvalues of the open loop single axis system will shift in a predetermined way. These eigenvalues will then appear as single complex pairs.

Assume the state model for a single axis to be represented by the form

$$\dot{x} = Ax + B\tau \tag{2-31}$$

with the state vector as

$$x(t) = \left[\omega_{21} \omega_{42} \psi_{21} \psi_{42} \vdots \omega_{31} \omega_{53} \psi_{31} \psi_{53} \vdots \omega_1 \psi_1 \right]^T \tag{2-32}$$

or in partitioned form

$$x(t) = \left[x_1(t) \vdots x_2(t) \vdots x_3(t) \right]^T \tag{2-33}$$

Substituting (2-33) into (2-31) yields

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} A_{11} & A_{12} & A_{13} \\ A_{21} & A_{22} & A_{23} \\ A_{31} & A_{32} & A_{33} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} B_1 \\ B_2 \\ B_3 \end{bmatrix} \tau \tag{2-34}$$

with $A_{11} = A_{22}$ a 4x4 matrix representing individual solar wing dynamics, $A_{12} = A_{21}$ a 4x4 matrix representing the dynamic interaction of solar wing A on solar wing B, $A_{13} = 0$, $A_{23} = 0$, A_{31} and A_{32} are 2x4 matrices reflecting

the interaction of the solar wings on the rigid body and

$$A_{33} = \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}$$

contains the rigid body dynamics. Thus (2-34) becomes

$$\dot{x} = \begin{bmatrix} A_{11} & A_{12} & 0 \\ A_{12} & A_{11} & 0 \\ A_{31} & A_{32} & A_{33} \end{bmatrix} x + B\tau \qquad (2\text{-}35)$$

The open loop eigenvalues of (2-35) consist of the eigenvalues of A_{33} (designated as $\lambda(A_{33})$) plus the eigenvalues of the partitioned block

$$\begin{bmatrix} A_{11} & A_{12} \\ A_{12} & A_{11} \end{bmatrix} \qquad (2\text{-}36)$$

With A_{11} and A_{12} square and of the same dimension (i.e., 4x4), row and column manipulations on (2-36) yield

$$\begin{bmatrix} A_{11} - A_{12} & 0 \\ A_{12} & A_{11} + A_{12} \end{bmatrix} \qquad (2\text{-}37)$$

Since eigenvalues of (2-36) are unaffected by row and column manipulations, the eigenvalues in (2-36) equal the eigenvalues of (2-37). But (2-37) is in block diagonal form, thus the eigenvalues of A in (2-34) equal the eigenvalues of A_{33}, plus the eigenvalues of $A_{11} - A_{12}$, plus the eigenvalues of $A_{11} + A_{12}$; i.e.,

$$\lambda(A) = \lambda(A_{33}), \quad \lambda(A_{11}+A_{12}), \quad \lambda(A_{11}-A_{12}) \qquad (2\text{-}38)$$

If $A_{12} = 0$, then the eigenvalues will appear in double complex pairs. Hence any departure of A_{12} from the zero matrix will cause an eigenvalue shift in the manner described by (2-38).

Re-ordering the state vector for each of the single axis models as in (2-32), the single axis eigenvalues previously computed were similarly obtained using (2-38). Thus the significant eigenvalue shifts in both the X and Y axes result from the cross-coupled interactions of the solar wings in the respective axis and <u>not</u> by any cross-axis coupling.

To obtain a qualitative measure of the interactive eigenshifts, assume $\psi_{21} = \psi_{31}$ and $\psi_{42} = \psi_{53}$ in both magnitude and phase for all time. This is equivalent to a symmetry assumption about the main unit. The eigenvalues for each axis are subsequently computed as (Set C):

X-axis			Y-axis		
	0.0			0.0	
	0.0			0.0	
-.0153606	$\pm$	j 0.641803	-.0697786	$\pm$	j 7.13515
-.0149224	$\pm$	j 1.61229	-.482064	$\pm$	j20.9874
-.0153606	$\pm$	j 0.641803	-.0697786	$\pm$	j 7.13515
-.0149224	$\pm$	j 1.61229	-.482064	$\pm$	j20.9874

Z-axis

0.0		
0.0		
-.00500564	$\pm$	j 1.00112
-.00160836	$\pm$	j 0.320495
-.00500564	$\pm$	j 1.00112
-.00160836	$\pm$	j 0.320495

Comparing eigenvalue Set C with eigenvalue Set B we conclude that the symmetry assumption for the z axis (and possible the y axis) is worthy of further investigation. The eigenvalue shift in the x-axis as caused by the solar panel interations suggests that this axis model should be treated in its entirety.

2.3 REFERENCES

2-1 Hooker, W. W. and Margulies, G., "The Dynamical Attitude Equations for an N-body Satellite", Journal of the Astronautical Sciences, Vol. XII, No. 4, PP. 123-128, 1965.

2-2 Lipski, D. B., "Discrete Coordinate Approach to Analytical Modeling of Flexible Bodies 11, to Distribution, Bendix Research Lab, 22 February, 1979.

2-3 Lipski, D. B., "Linearized Five Body Space Base Simulation Model", to Distribution, Bendix Research Lab, 23 April, 1979.

SECTION 3

SECTION 3

3.0 CONTROL APPROACHES

Three diverse techniques are, in the succeeding subsections, described which are applicable to the control of large, flexible vehicles. The first technique (multilevel control) solves a complex control problem by reducing the solution to a large number of simpler problems. The second approach (LQR) utilizes some of the basic concepts of modern control theory for determining the optimal control loop feedback. The third scheme (MNA) reduces the effective cross-coupling of a complex "plant" to an extent that the closed loop design reduces to a set of independent single loop design problems; techniques for obtaining closed loop pole placement are also utilized in this approach.

The theoretical background and references for each control approach are presented in this section. The actual equations and some simulation results as applied to Configuration 1 of the Space Construction Base are offered in Sections 4, 5 and 6 for the multilevel, LQR and MNA control approaches respectively.

3.1 MULTILEVEL CONTROL

The control of large-scale multivariable systems is a class of control problems that arises in many areas of practical application. Direct application of control to a large-scale system often severely taxes or exceeds available computer capacity due to the high dimensions involved in the overall control problem to be solved. Application of multilevel systems analysis techniques to the large overall control problem decomposes it into

a multilevel hierarchy of subproblems of smaller dimension. An example of a two level subproblem hierarchy is depicted in Figure 3-1.

In general a subproblem hierarchy resulting from the application of multilevel control techniques may contain several levels of subproblems. The roles of the subproblems are correlated with the levels that they occupy in the hierarchy. Each of the subproblems on the lowest (first) level of the hierarchy pertains to a portion of the original system to be controlled. Each of the subproblems on a level above the lowest one pertain to coordination of the solutions of the subproblems on the next lower level. The number of subproblems per level decreases as the level becomes higher in the hierarchy until the top or supremal level is occupied by a single overall coordination subproblem.

Each subproblem comprising the hierarchy transmits its solution(s) to other subproblems in the hierarchy in the course of the solution of the overall control problem. Such a solution proceeds iteratively. For example, the subproblems of the two level hierarchy may be solved in the following sequence. The second level coordination subproblem provides coordination variables, $\underline{C}$, $\underline{\rho}$, which are held fixed while the optimal solutions for $\underline{x}$, $\underline{\lambda}$ and $\underline{u}$ are determined for all of the first level subproblems independently. After the optimal solution is obtained for each first level subproblem, numerical responses are sent to the coordination subproblem on the second level. The coordination subproblem

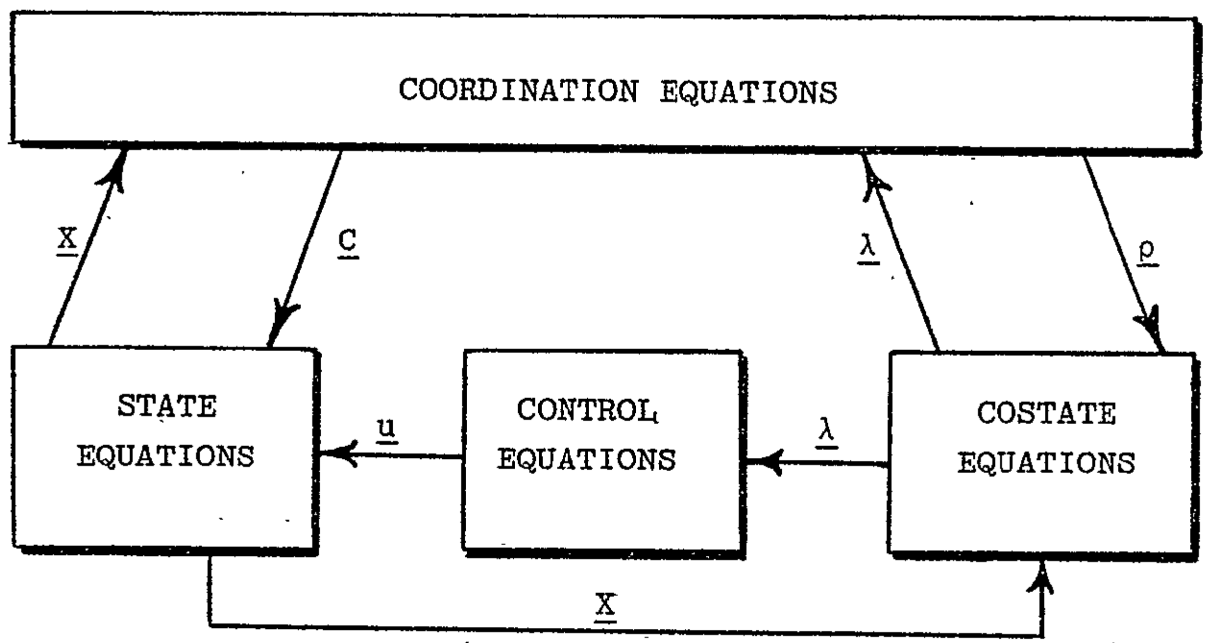


FIGURE 3-1 Two Level Subproblem Hierarchy For Multilevel Control

now adjusts the coordination variables and sends their adjusted values to the subproblems on the first level. The first level subproblems are again solved independently with the adjusted values of the coordination variables. This procedure continues iteratively until the overall coordination problem at the top of the hierarchy is satisfied. The result sought is an optimized collection of subsystems, with interconnections restored, which is equivalent to the original controlled system optimized. This procedure may be readily extended to subproblem hierarchies with more than two levels.

3.1.1 General Approach

The overall procedure to be utilized in applying multi-level control techniques to a mathematical model of a system to be controlled is outlined as follows:

1. Express mathematical model in state variable form.

2. Decompose mathematical model into set of decoupled equations.

3. Construct decomposed performance index.

4. Form decomposed Hamiltonian.

5. Develop costate equations with associated coordination equations.

6. Develop control algorithm.

7. Construct subproblem hierarchy.

8. Simulate subproblem hierarchy on digital computer.

3.1.2 State Variable Model

$$\dot{x} = Ax+Bu \tag{3-1}$$

where:

$$x = (x_{1,} x_{2,} ---x_n)^T \text{ (state vector)} \tag{3-2}$$

$$u = (u_{1,} x_{2,} ---u_m)^T \text{ (control vector)} \tag{3-3}$$

$$A = nxn \text{ matrix} \tag{3-4}$$

$$B = nxm \text{ matrix; } m \leq n \tag{3-5}$$

Equation (3-1) is the canonical state variable form of the mathematical model of the system to be controlled. It represents a set of n simultaneous scalar ordinary linear differential equations which; in general, are coupled.

Typical scalar state equation:

$$\dot{x}_i = f_i(x,u) = \sum_{j=1}^{n} a_{ij}x_j + \sum_{j=1}^{m} b_{ij}u_j \text{ , } i = 1, 2, ---, n \tag{3-6}$$

$$\text{where } \quad f = (f_{1,} f_{2,} ---, f_n)^T \tag{3-7}$$

3.1.3 Decomposed Model

Define state coordination variables with following coordination equations.

$$C_i = g_i = \sum_{\substack{j=1 \\ j\neq i}}^{n} a_{ij}x_j + \sum_{\substack{j=1 \\ j\neq i}}^{m} b_{ij}u_j \qquad (3\text{-}8)$$

Then the scalar state equations may be written in decomposed (decoupled) form as follows:

$$\dot{x}_i = f_i = a_{ii}x_i + b_{ii}u_i + C_i \qquad (3\text{-}9)$$

with the initial condition,

$$x_i(o) = x_{io} \qquad (3\text{-}10)$$

3.1.4 Performance Index

Original performance index to be minimized:

$$P = \int_{t_o}^{t_f} (x^TQx + u^TRu)\, dt \qquad (3\text{-}11)$$

where

Q = nxn weighting matrix
R = mxm weighting matrix
t_o = initial time in interval considered
t_f = final time in interval considered

If the matrices Q and R are diagonal, the performance index is said to be saparable and it may be written in decomposed (decoupled) form as follows:

$$P = \Sigma P_i \qquad i = 1,2,---,n \tag{3-12}$$

where: $$P_i = \int_{t_o}^{t_f} p_i dt \tag{3-13}$$

$$p_i = q_i x_i^2 + r_i u_i^2 \quad \text{for } i = 1,2,---m \tag{3-14}$$

$$p_i = q_i x_i^2 \qquad \text{for } i = m+1,---,n \tag{3-15}$$

3.1.5 Hamiltonian

The Hamiltonian is proportional to the energy of the system and may be written in decomposed form as follows:

$$H = \Sigma H_i \qquad i = 1,2,---,n \tag{3-16}$$

where:

$$H_i \doteq p_i+\lambda_i f_i+\rho_i(g_i-C_i) \tag{3-17}$$

λ_i = ith scalar costate variable

ρ_i = ith Lagrange multiplier associated with the ith state coordination equation.

According to Pontryagin's minimum principle minimization of the Hamiltonian corresponds to optimization of the controlled system with respect to the performance index given in (3-11). Application of the necessary conditions for minimization of the Hamiltonian of the controlled system generates the costate, control and costate coordination equations for the system to be optimized.

3.1.6 Costate Equations

$$\dot{\lambda}_i = -\frac{\partial H}{\partial x_i}$$

$$= -a_{ii}\lambda_i - 2q_i x_i - \sum_{\substack{j=1 \\ j\neq i}}^{n} a_{ji}\rho_j \, , \quad i = 1,2,---,n \qquad (3\text{-}18)$$

with the final condition,

$$\lambda_i \, (t_f) = 0 \qquad (3\text{-}19)$$

3.1.7 Costate Coordination Equations

$$\frac{\partial H}{\partial C_i} = 0 \rightarrow \rho_i = \lambda_i; \quad i = 1,2,---,n \qquad (3\text{-}20)$$

3.1.8 Control Equations

For a system that is operating suboptimally with respect to its performance index, some of the necessary optimality conditions applied to its Hamiltonian will not be satisfied at the outset. The selection of the specific set of necessary conditions to be temporarily violated at the beginning of operation of the system determines the nature of the decomposition of the system. In this case it is assumed that the system decomposition is such that all of the necessary conditions listed so far, (3-18), (3-20), and the necessary conditions leading to the state and state coordination equations are satisfied throughout the time interval of interest, (t_o, t_f). Given these conditions, for suboptimal operation at the outset, the necessary condition associated

with the control variables cannot be satisfied at the outset. It is therefore approached during the operation of the system by means of the following gradient formulation.

$$(u_i)_{\ell+1} = (u_i)_\ell - s_i \left(\frac{\partial H}{\partial u_i}\right)_\ell, \quad i = 1,2,---,m \qquad (3\text{-}21)$$

where:

ℓ = the iteration subscript

s_i = constants to be chosen on the basis of the rate of approach of the controlled system to optimal operation.

From (3-8), (3-9), (3-14) and (3-17) an expression may be written for the gradient of the Hamiltonian with respect to each scalar control variable as follows.

$$\frac{\partial H}{\partial u_i} = 2r_i u_i + \sum_{j=1}^{n} b_{ji}\lambda_j \qquad (3\text{-}22)$$

3.1.9 Subproblem Hierarchy

Equations (3-8) and (3-20) may be assembled into an overall coordination subproblem for the generation of the optimal control contours. Equations (3-9) with their associated initial conditions, equations (3-10), constitute the first level state subproblems to be solved. Since these equations are temporarily decoupled from each other, they may be regarded as n subproblems each of which can be solved independently. Similarly, (3-18) with the final conditions of (3-19) may be associated into a first

level costate subproblem and (3-21) and (3-22) may be assembled into an overall control subproblem. These four subproblems may then be assembled into a hierarchy with the coordination subproblem at its apex as shown in Figure 3-1.

3.2 LINEAR QUADRATIC REGULATOR (LQR)

With a linear system described in the state variable form

$$\dot{x} = Ax + Bu \tag{3-23}$$

where x = the system state variable vector
u = the control vector
A,B = the system matrices,

an optimum feedback control $u = Fx$ can be determined by utilizing Pontryagin's minimum principle.

An expression for the optimum feedback F can be derived (References 3-4 and 3-5) through application of either Hamilton-Jacobi equations or utilizing the second method of Liapunov with a "quadratic cost" system performance index.

$$PI = \int_0^T (x^TQx + u^TRu)\, dt \tag{3-24}$$

where T = upper limit in time (could also be infinite in some derivations)

Q,R = weighting factors, where Q must be at least a positive semidefinite matrix and R must be positive definite

For an initial state x(0), a matrix Riccati equation is generated by either approach from (3-23) and (3-24),

$$-\dot{P} = PA + A^TP - PBR^{-1} B^TP + Q \tag{3-25}$$

where $P = P(t)$ and must be positive definite
$\dot{P} = \dot{P}(t)$.

and the equation is subject to the boundary condition $P(T) = 0$. Ordinarily, this equation can be integrated backward in time from the known terminal condition over the time period of interest. $\dot{P}$ approaches zero as T is increased towards infinity, and the P matrix becomes a constant designated as $\bar{P}$. The optimum feedback matrix is then

$$F = -R^{-1}B^T\bar{P} \tag{3-26}$$

as derived from the approaches cited. Equation (3-23) can now be rewritten as a function of the state variables only

$$\dot{x} = (A-BF)x = (A+BR^{-1}B^T\bar{P})x \tag{3-27}$$

Note that this equation implies that <u>all</u> the state variables must be fed back to obtain an optimal control system. Careful selection of state variables, or filtering of a set of measured variables, will be required

for feedback control of large flexible vehicles. These structures are actually a network of distributed spring and mass parameters, rather than a finite number of discrete or lumped elements.

An application of the LQR technique to the control of a flexible vehicle, represented by discrete parameters, is demonstrated in Section 5 of this report. A solution of the system's matrix Riccati equation is given, along with an optimal closed loop simulation.

3.3 MULTIVARIABLE NYQUIST ARRAY (MNA)

The MNA control method used here is combined with a pole placement technique. The basic MNA approach will be described first and will then be followed by a brief description of the pole placement procedure.

3.3.1 MNA Design Procedure

The fundamental objective of the MNA design method is to decrease crosscoupled system interaction to such an extent that the closed loop system design reduces to a set of independent single loop design problems. Although simply stated, the actual reduction procedure proposed by Rosenbrock (Reference 3-6) and implemented by Munro (Reference 3-7) requires a high degree of designer intervention and is fundamentally a trial and error process.

In Figure 3-2, G(S) is an mxm transfer matrix representing the coupling of m inputs and m outputs. Restriction of G(s) to a square matrix simplifies the analysis, programming and computational effort considerably.

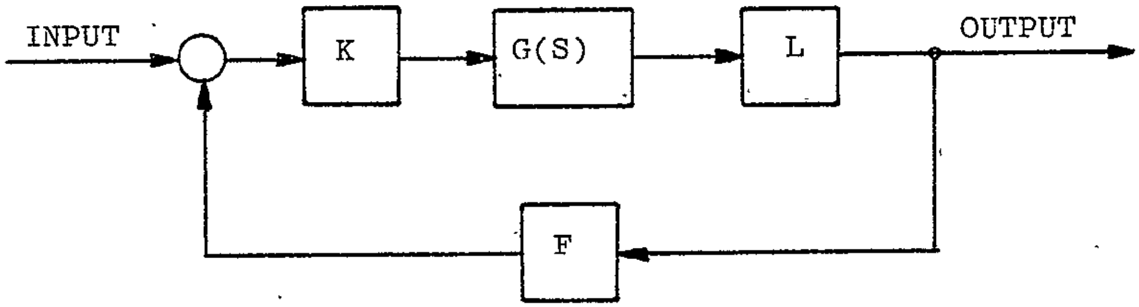


FIGURE 3-2 MULTIVARIABLE SYSTEM CONFIGURATION

The pre- and post-compensator matrices K and L, respectively are each of dimension mxm. The feedback gain matrix, F, is assumed to be diagonal and of similar dimensions. Clearly, if

$$Q(S) = LG(S)K \tag{3-28}$$

is diagonal, loop closure may proceed on an individual loop basis with a guarantee of zero loop interaction. It is this premise upon which the MNA design philosophy is based. The adherence to strict diagonalization is relaxed, however, with the substitution and exploitation of the concept of diagonal dominant matrices.

A matrix Z(S) is diagonal dominant if either or both of the following conditions are present for all S:

a. $$\sum_{\substack{j=1 \\ i\neq j}}^{m} |z_{ij}(S)|/|z_{ii}(S)| \leq \theta_i < 1 \text{ for all } i=1,2,---m \tag{3-29}$$

b. $$\sum_{\substack{j=1 \\ j\neq i}}^{m} |z_{ji}(S)|/|z_{ii}(S)| \leq \theta_i < 1 \text{ for all } i = 1,2,---m \qquad (3\text{-}30)$$

Equation (3-29) defines row dominance while (3-30) defines the column dominance condition where θ_i is the level of dominance obtained for the ith diagonal element.

Before the design process can proceed further, Q(S) for the direct Nyquist array (DNA) method or $Q^{-1}(S)$ in the inverse Nyquist array (INA) method must be made dominant by manipulation of the elements of the compensator matrices. Once dominance is achieved the design process is completed using single loop theory to select the diagonal elements of F. This selection process is enhanced through application of the Gershgorin and the Ostrowski theorems for dominant matrices.

The Gershgorin theorem (Reference 3-6) states that the eigenvalues of a matrix (either Q(S) or $Q^{-1}(S)$) are located in the union of the bands centered about the diagonal elements with widths determined by the sum of the moduli of the off diagonal elements by row or by column. Using the envelope procedure developed by Crossley (Reference 3-8) and considering each control loop separately, a graphical display of open loop system interaction results. The feedback gain selection for control loop i is then made in correspondence with the generalized Nyquist criterion and the stability theorems of Rosenbrock (Reference 3-6).

The Ostrowski theorem may be used to further shrink the Gershgorin bands, thereby reducing the area of uncertainty in each loop. This set of bands is frequently referred to as a set of "fuzzy" Nyquist plots (or inverse Nyquist plots for the INA). Using the innermost band as a conservative estimate of the Nyquist contour in each loop, the design proceeds on a single loop basis. Feedback gain selection must be made exterior to the Gershgorin (Ostrowski) band. Thus, phase margin, gain margin an dynamic compensation may be used to evaluate and/or improve the loop design with a guarantee of low interaction from the closure of the remaining loops.

Diagonal dominance for the DNA method requires the selection of pre- and post-compensator matrix parameters so that (3-29) is satisfied when (3-28) represents the open loop transfer matrix. For the INA method $Q^{-1}(S)$ is used and the parameters of K^{-1} and L^{-1} must be selected.

An efficient and reliable method for the evaluation of the matrix coefficients is described in Reference 3-9. The dominance algorithm uses a conjugate direction function minimization algorithm to adjust the parameter set until a performance index composed of the dominance definitions in (3-29) and (3-30) is minimized. For the INA method in a row dominance mode, the optimization problem can be separated into three independent optimization efforts; one for each row. Here the performance index by row is

$$J_i(K_{ij}) = \underset{w}{\mathrm{Max}} \sum_{\substack{j=1 \\ i\neq i}}^{m} |\hat{q}_{ij}(S)| / |\hat{q}_{ii}(S)| , \quad i=1,2,---,m \qquad (3-31)$$

where $\hat{q}_{ij}(S)$ is an element of $Q^{-1}(S)$. For each i, the ith row of K^{-1} is adjusted until $J_i(K_{ij})$ is minimized. In practice, the ratio in (3-31) is computed for each discrete frequency point in the range of interest. This array is then scanned to identify the maximum ratio. Adjusting the elements of row i in K^{-1} yields a set of final dominance levels

$$\theta_i = \min_{K_{ij}} J_i(K_{ij}) \qquad (3\text{-}32)$$

If the dominance levels in (3-32) are less than unity, diagonal dominance has been achieved. In the event that some of the dominance levels are greater than one, the designer may initiate a dominance sharing search or restart the program using new starting values for the unspecified compensator parameters.

The concept of dominance sharing is detailed in Reference 3-10. It is fundamentally a rescaling of the compensator matrices to the extent that low dominance levels may be intentionally increased to a point where the previous non-dominant levels may be shifted to a range of acceptability. This procedure has been automated in the latest version of the dominance algorithm and is initiated by the designer after the final set of dominance levels have been evaluated.

Once a set of coefficients has been determined for dominance of the open loop transfer matrix, each control loop may be treated independently using single-input/

single-output control theory. The dominance algorithm briefly outlined above shifts the burden of establishing the dominance condition from the designer to an automated procedure. Thus designer intervention is only required during the actual design process and is no longer needed to establish the requisite dominance condition. Experience with the algorithm suggests that dominance may often be obtained within several CPU minutes or less depending upon the characteristics of G(S).

Using the appropriate transfer functions for the vehicle model, a DNA design was initiated over a frequency range which includes the critical modes. Recent results described in reference 3-11 for finite frequency Nyquist array design established this range as acceptable for design and stability purposes. For this DNA design the post compensator matrix was prespecified as the identity matrix with the precompensator matrix selected in accordance with the dominance algorithm in reference 3-9. The closed loop diagram for vehicle control, with

$$Q(S) = L\ G(S)K$$

representing the open loop transfer matrix, is shown in Figure 3-3.

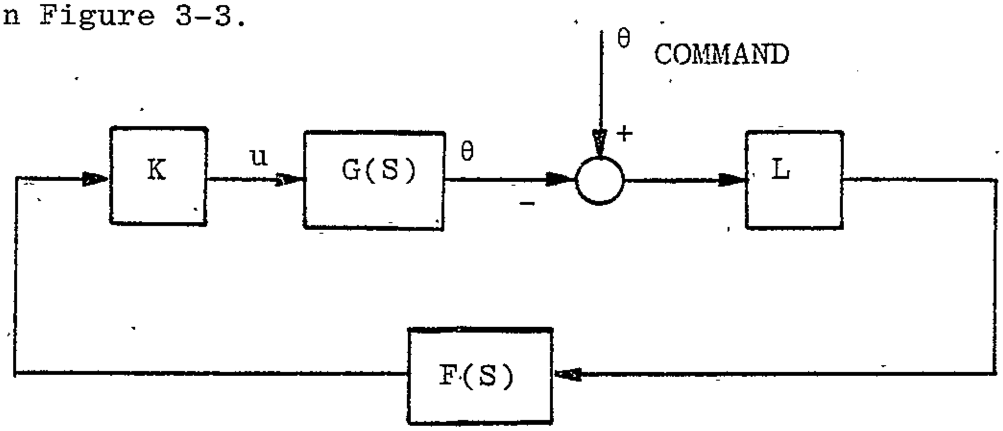


Figure 3-3 Closed Loop Spacecraft Control Design

3.3.2 Retallack Pole Placement Method

The dyadic pole placement technique developed by Simon and Mitter, reference 3-12, and further refined by Retallack and MacFarlane, reference 3-13, utilizes the model structure of a linear system to give the designer direct control over the movement of given system modes to desired closed loop locations. This method is particularly attractive from a design viewpoint whenever the open loop poles can be directly associated with specific parts of the physical system. In this way only those poles directly associated with the subsystem will be shifted. Let λ_j $(j=1,\ldots.n)$ represent the open loop poles of the system and let $\rho_i(i=1,\ldots,n)$ be the desired closed loop set. Several algorithms are presently available to shift the eigenvalue set $\{\lambda_j\}$ to the desired set $\{\rho_i\}$. However there is no guarantee that any particular eigenvalue λ_k will be moved to a specific location ρ_k. Without the eigenvalue location assignment flexibility, the resulting control in light of sensor and/or actuator failures could result in very unsatisfactory performance.

Consider the linear, time-invariant, multivariable system described by

$$\dot{x}=Ax+Bu \qquad (3\text{-}34)$$

where x is n vector of states, u is m vector of inputs and $m \leq n$. If constant gain state feedback of the form

$$u=\gamma-Kx \qquad (3\text{-}35)$$

is introduced into the system of (3-34) the resulting

system obeys

$$\dot{x} = (A-BK)x + B\gamma \qquad (3\text{-}36)$$

where γ is the external control. The open-loop poles $(\lambda_1,\ldots\lambda_n)$ of the system of (3-34) and the closed loop poles $(\rho_1,\ldots\rho_n)$ of the system (3-36) are related by the Hsu-Chen equation (reference 3-14).

$$|I_n-(SI_n-A)^{-1}BK| = \frac{\prod_{i=1}^{n} (S-\rho_i)}{\prod_{j=1}^{n} (S-\lambda_j)}$$

The Jordan canonical form for A is given by

$$\Lambda=U^{-1}AU \qquad (3\text{-}38)$$

where U is a modal matrix for A. Let $(\lambda_1,\lambda_2,\ldots\lambda_p)$ $p\leq m$ be the open loop poles to be shifted and define the modal controller K in terms of the unity rank dyadic product

$$K=fd^TV \qquad (3\text{-}39)$$

where f is an m vector, d is a p vector and V contains the p rows of U^{-1} corresponding to $(\lambda_1,\ldots\lambda_p)$. With this definition, K Retallack (reference 3-13) reduces equation (3-37) to

$$1 + d^T(SI_p-\tilde{\Lambda})^{-1}\beta = \frac{\prod_{i=1}^{p}(S-\rho_i)}{\prod_{j=1}^{p}(S-\lambda_j)} \qquad (3\text{-}40)$$

where

$$\beta = VBf \qquad (3\text{-}41)$$

and $\tilde{\Lambda}$ is the p x p Jordan submatrix for $(\lambda_1,\lambda_2,\ldots\lambda_p)$. The remaining open-loop modes $(\lambda_{p+1},\ldots\lambda_n)$ are unchanged

under dyadic feedback.

To overcome some of the numerical difficulties associated with the computation of the modal controller when clustered poles appear near the imaginary axis (reference 3-15) the system in (3-34) is transferred to the Luenberger canonical form (reference 3-16),

$$\dot{w} = \hat{A}w + \hat{B}u \qquad (3\text{-}42)$$

where $w=U^{-1}x$

$$\hat{A}=U^{-1}AU \qquad (3\text{-}43)$$

$$\hat{B}=U^{-1}B \qquad (3\text{-}44)$$

An efficient algorithm to realize this transformation is presented in reference 3-17. Since the eigenvalues of $(\hat{A}-\hat{B}\hat{K})$ are identical to those of $(A-BK)$, the pole placement process can be accomplished in the closed loop system of (3-42), rather than in the closed loop system of (3-34). Once the gain matrix $\hat{K}$ has been determined for the canonical system, the desired modal controller K for the original system (3-34), is given by

$$K = \hat{K}U^{-1} \qquad (3\text{-}45)$$

This pole placement method was used in this study to shift the open loop poles of the vehicle model for analysis and control system design purposes.

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SECTION 4

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4.0 SIMULATION OF MULTILEVEL CONTROL

The principal objective of this section is the development of mathematical models of a flexible space vehicle that are amenable to application of multilevel control techniques and construction of digital computer simulations of each vehicle model and its associated multilevel control system. In this development effort mathematical models for attitude stabilization of the Space Construction Base (SCB) have been utilized because these models are deemed representative of the corresponding models of flexible space vehicles in general and because data were available at the outset for the SCB models.

The effort expended on the simulation of models of the vehicle with multilevel control since the last report, Chichester (4-1), has been divided into three main areas which are discussed in subsections 4.1, 4.2 and 4.3, respectively. Subsection 4.1 describes the development of a linearized scalar state variable form of the three dimensional discrete mass rotational model for Configuration 1 of the SCB from the model originally presented by Cornell (4-2). This subsection summarizes work presented in Lipski (4-3) and (4-4), and Chichester (4-5). The resulting models are suitable for direct application of multilevel control techniques.

Subsection 4.2 presents the application of multilevel control techniques to the models of subsection 4.1. This application follows the sequence previously described in Chichester (4-1), (4-6). The resulting model is of rather high dimension for all but the minimum

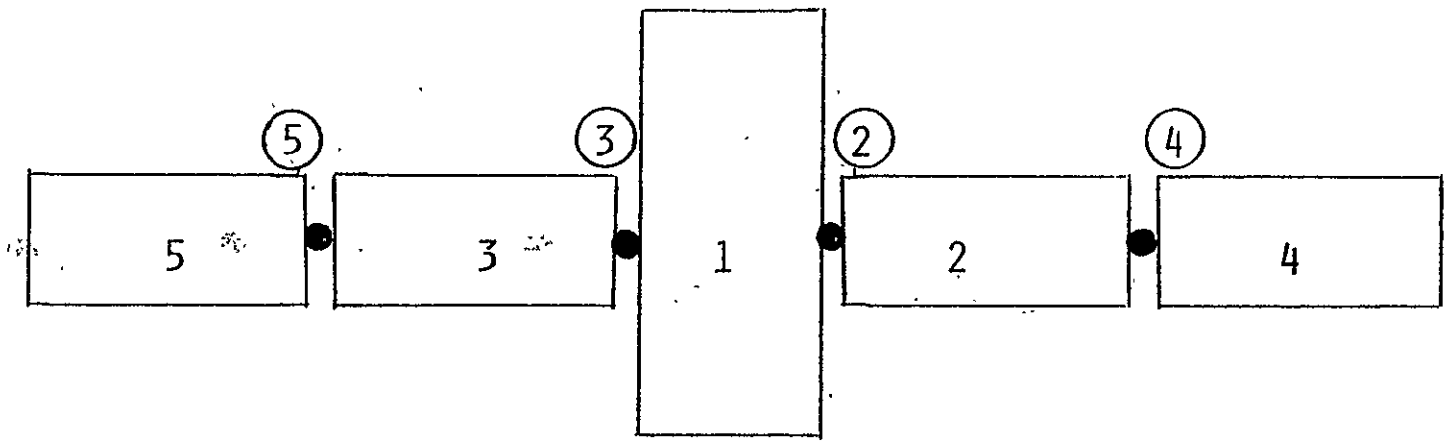
form of the SCB, Configuration 1, and the most limited application of control torques, application to the central body only.

Subsection 4.3 describes simple hybrid coordinate models of Configuration 1 of the SCB, linear models of lower dimension than the corresponding models of subsection 4.1. This subsection concludes with the application of multilevel control techniques to these hybrid coordinate models. The approach presented in this subsection is based upon work appearing in Likins (4-7) and Chichester, Kaczynski and Nachmias (4-8).

Subsection 4.4 presents conclusions based upon the work presented in Subsections 4.1 through 4.3 and recommendations for future work in the application of multilevel control to models of flexible space vehicles.

4.1 LINEARIZED THREE-DIMENSIONAL DISCRETE MASS ROTATIONAL MODEL FOR CONFIGURATION 1.

Configuration 1 of the SCB consists of two solar wings connected to four contiguous modules which are considered to be rigid relative to the solar wings. The simulation model for this configuration was derived using the discrete coordinate approach and approximation by five rigid bodies. Each solar wing was converted to two rigid bodies with overall designations as shown in Figure 4-1.



(The individual bodies are connected to each other via three degree of freedom spring hinge suspensions. Hinge numbers are circled.)

TOPOLOGICAL DIAGRAM OF SCB CONFIGURATION 1

FIGURE 4-1

4.1.1 Definitions

$\tilde{A}$ Skew-symmetric matrix of the Gibbsian vector A.

$$\tilde{A} \triangleq \begin{bmatrix} 0 & -a_z & a_y \\ a_z & 0 & -a_x \\ -a_y & a_x & 0 \end{bmatrix}$$

$R_{i,j}$ Vector from C.M. of body i to hinge j in body i coordinates.

$\dot{\omega}_i$ Inertial angular acceleration vector of body i expressed in body i coordinates.

$A_{i,j}$ 3 x 3 submatrix of the 15 x 15 coefficient matrix as shown in paragraph 2.

${}_jT_i$ 3 x 3 transformation matrix from body i coordinates to body j coordinates.

m_i Mass of body i.

ΣM Sum of masses of all five bodies.

I_i Inertia matrix of body i.

A^T Matrix transpose of A.

$\omega_{Ri,j} \triangleq \omega_i \times (\omega_i \times R_{i,j})$

T_{ei} External torque vector on body i.

T_{ai} Actuator or control torque vector on body i.

$T_{si,j}$ Suspension torque vector between bodies i and j.

4.1.2 Rotational Equations of Motion

The rotational equations of motion were derived using the method of discrete coordinates and take the generalized form:

$$\begin{bmatrix} a_{1,1} & \cdots & a_{1,15} \\ \vdots & & \vdots \\ a_{15,1} & \cdots & a_{15,15} \end{bmatrix} \begin{bmatrix} \dot{\omega}_{1x} \\ \dot{\omega}_{1y} \\ \vdots \\ \dot{\omega}_{5z} \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \\ \vdots \\ c_{15} \end{bmatrix} \quad (4\text{-}1)$$

For convenience, (4-1) can be expressed in terms of 3 x 3 submatrices and Gibbsian vectors as:

$$\begin{bmatrix} A_{1,1} & A_{1,2} & A_{1,3} & A_{1,4} & A_{1,5} \\ A_{2,1} & A_{2,2} & & & \vdots \\ \vdots & & & & \vdots \\ A_{5,1} & \cdots & & & A_{5,5} \end{bmatrix} \begin{bmatrix} \dot{\omega}_1 \\ \vdots \\ \dot{\omega}_5 \end{bmatrix} = \begin{bmatrix} C_1 \\ \vdots \\ C_5 \end{bmatrix} \quad (4\text{-}2)$$

For the linearized discrete mass model,

$$
{}_{i}T_{j} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \forall \text{ i and j} \qquad (4\text{-}3)
$$

Since the elements of the linearized coefficient matrix are constant, the matrix inverse need be computed only initially. Appropriate symmetry conditions for the linearized model of Configuration 1, may be stated as follows:

$$
\begin{aligned}
m_3 &= m_2 \\
m_5 &= m_4 \\
I_3 &= I_2 \\
I_5 &= I_4 \\
R_{1,3} &= R_{1,2} \\
R_{3,3} &= R_{2,2} \\
R_{3,5} &= R_{2,4} \\
R_{5,5} &= R_{4,4}
\end{aligned} \qquad (4\text{-}4)
$$

Using skew-symmetric matrices as defined and the above listed symmetry properties, the 3 x 3 sub-matrices of (4-2) take the following form.

$$A_{1,1} = I_1 - 2(m_2+m_4)\left[1-2\left(\frac{m_2+m_4}{\Sigma M}\right)\right] \tilde{R}_{1,2}\,\tilde{R}_{1,2} \tag{4-5}$$

$$\begin{aligned} A_{2,2} = {} & I_2 + (m_2+m_4)\left(\frac{m_2+m_4}{\Sigma M}-1\right) \tilde{R}_{2,2}\,\tilde{R}_{2,2} \\ & +m_4\left(1-\frac{m_2+m_4}{\Sigma M}\right)\{\tilde{R}_{2,2}\,\tilde{R}_{2,4} + \tilde{R}_{2,4}\,\tilde{R}_{2,2}\} \\ & +m_4\left(\frac{m_2}{\Sigma M}-1\right) \tilde{R}_{2,4}\,\tilde{R}_{2,4} = A_{3,3} \end{aligned} \tag{4-6}$$

$$A_{4,4} = I_4 + m_4\left(\frac{m_4}{\Sigma M}-1\right) \tilde{R}_{4,4}\,\tilde{R}_{4,4} = A_{5,5} \tag{4-7}$$

$$\begin{aligned} A_{1,2} = {} & (m_2+m_4)\left\{1-2\left(\frac{m_2+m_4}{\Sigma M}\right)\right\}\{\tilde{R}_{1,2}\,\tilde{R}_{2,2} + \tilde{R}_{1,2}\,\tilde{R}_{2,4}\} \\ & = A_{1,3} = A_{2,1}{}^T = A_{3,1}{}^T \end{aligned} \tag{4-8}$$

$$\begin{aligned} A_{1,4} = {} & m_4\left\{1-2\left(\frac{m_2+m_4}{\Sigma M}\right)\right\} \tilde{R}_{1,2}\,\tilde{R}_{4,4} = A_{1,5} \\ & = A_{4,1}{}^T = A_{5,1}{}^T \end{aligned} \tag{4-9}$$

$$\begin{aligned} A_{2,3} = {} & (m_2+m_4)\left(\frac{m_2+m_4}{\Sigma M}\right) \tilde{R}_{2,2}\tilde{R}_{2,2} \\ & -\left(\frac{m_2+m_4}{\Sigma M}\right)m_4 \{\tilde{R}_{2,2}\,\tilde{R}_{2,4} + \tilde{R}_{2,4}\,\tilde{R}_{2,2}\} \\ & -\frac{m_4{}^2}{\Sigma M} \tilde{R}_{2,4}\,\tilde{R}_{2,4} = A_{3,2} \end{aligned} \tag{4-10}$$

$$\begin{aligned} A_{2,4} = {} & m_4\left(\frac{m_2+m_4}{\Sigma M}-1\right) \tilde{R}_{2,2}\,\tilde{R}_{4,4} + m_4\left(1-\frac{m_4}{\Sigma M}\right) \tilde{R}_{2,4}\,\tilde{R}_{4,4} \\ & = A_{3,5} = A_{4,2}{}^T = A_{5,3}{}^T \end{aligned} \tag{4-11}$$

$$A_{2,5} = m_4 \left(\frac{m_2+m_4}{\Sigma M}\right) \tilde{R}_{2,2} \tilde{R}_{4,4} - \frac{m_4^{2}}{\Sigma M} \tilde{R}_{2,4} \tilde{R}_{4,4} \quad (4\text{-}12)$$

$$= A_{3,4} = A_{5,2}^{T} = A_{4,3}^{T}$$

$$A_{4,5} = \frac{m_4^2}{\Sigma M} \tilde{R}_{4,4} \tilde{R}_{4,4} = A_{5,4}^{T} \quad (4\text{-}13)$$

In the expansions of the 3 x 3 linearized coefficient submetrices of (4-5) through (4-13) triple vector products of the following form occur repeatedly.

$$R_{ik} \times (\dot{\omega}_j \times R_{j\ell}) = - \left[\tilde{R}_{ik} \tilde{R}_{j\ell}\right] \dot{\omega}_j \quad (4\text{-}14)$$

These triple vector products may be transformed to the following form in order to derive the expressions for each element of the 3 x 3 coefficient submatrices

$$-\left[\tilde{R}_{ik} \tilde{R}_{j\ell}\right] \dot{\omega}_j = \begin{bmatrix} e_{11} & e_{12} & e_{13} \\ e_{21} & e_{22} & e_{23} \\ e_{31} & e_{32} & e_{33} \end{bmatrix} \begin{bmatrix} \dot{\omega}_{jx} \\ \dot{\omega}_{jy} \\ \dot{\omega}_{jz} \end{bmatrix} \quad (4\text{-}15)$$

The elements of the coefficient matrix in (4-15) can be expressed in terms of the scalar components of R_{ik} and $R_{j\ell}$ as follows.

$$e_{11} = R_{iky} R_{j\ell y} + R_{ikz} R_{j\ell z}$$

$$e_{12} = -R_{iky} R_{j\ell x}$$

$$e_{13} = -R_{ikz} R_{j\ell x}$$

$$e_{21} = -R_{ikx} R_{j\ell y}$$

$$e_{22} = R_{ikx} R_{j\ell x} + R_{ikz} R_{j\ell z} \quad (4\text{-}16)$$

$$e_{23} = -R_{ikz} R_{j\ell y}$$

$$e_{31} = -R_{ikx} R_{j\ell z}$$

$$e_{32} = -R_{iky} R_{j\ell z}$$

$$e_{33} = R_{ikx} R_{j\ell x} + R_{iky} R_{j\ell y}$$

The linearized vector components of the right side of (4-2) are the following vector sums:

$$C_1 = T_{e1} + T_{a1} - T_{s1,2} - T_{s1,3}$$

$$C_2 = T_{e2} + T_{a2} + T_{s1,2} - T_{s2,4}$$

$$C_3 = T_{e3} + T_{a3} + T_{s1,3} - T_{s3,5} \quad (4\text{-}17)$$

$$C_4 = T_{e4} + T_{a4} + T_{s2,4}$$

$$C_5 = T_{e5} + T_{a5} + T_{s3,5}$$

4.1.3 Euler Angle Equations

Relative Euler angle rates between bodies 1 and 2, bodies 1 and 3, bodies 2 and 4 and, bodies 3 and 5

are used based on a ψ, θ, ϕ rotational sequence about the Z, Y and X axes respectively. Euler rates are also determined relating body 1 to inertial space. Assuming small angles, the rates become:

$$\begin{aligned} \Delta\dot{\phi}_{1,2} &= \omega_{2x}-\omega_{1x} \\ \Delta\dot{\theta}_{1,2} &= \omega_{2y}-\omega_{1y} \\ \Delta\dot{\psi}_{1,2} &= \omega_{2z}-\omega_{1z} \end{aligned} \tag{4-18}$$

$$\begin{aligned} \Delta\dot{\phi}_{1,3} &= \omega_{3x}-\omega_{1x} \\ \Delta\dot{\theta}_{1,3} &= \omega_{3y}-\omega_{1y} \\ \Delta\dot{\psi}_{1,3} &= \omega_{3z}-\omega_{1z} \end{aligned} \tag{4-19}$$

$$\begin{aligned} \Delta\dot{\phi}_{2,4} &= \omega_{4x}-\omega_{2x} \\ \Delta\dot{\theta}_{2,4} &= \omega_{4y}-\omega_{2y} \\ \Delta\dot{\psi}_{2,4} &= \omega_{4z}-\omega_{2z} \end{aligned} \tag{4-20}$$

$$\begin{aligned} \Delta\dot{\phi}_{3,5} &= \omega_{5x}-\omega_{3x} \\ \Delta\dot{\theta}_{3,5} &= \omega_{5y}-\omega_{3y} \\ \Delta\dot{\psi}_{3,5} &= \omega_{5z}-\omega_{3z} \end{aligned} \tag{4-21}$$

$$\dot{\phi}_1 = \omega_{1x} \tag{4-22}$$

$$\dot{\theta}_1 = \omega_{1y}$$

$$\dot{\psi}_1 = \omega_{1z}$$

4.1.4 Suspension Equations

The following torque equations are given in terms of rate and displacement constants (program parameters) and inertial rate differences and relative displacements.

$$T_{s1,2x} = -K_{s1,2x}\Delta\phi_{1,2} - C_{s1,2x}(\omega_{2x} - \omega_{1x})$$

$$T_{s1,2y} = -K_{s1,2y}\Delta\theta_{1,2} - C_{s1,2y}(\omega_{2y} - \omega_{1y}) \tag{4-23}$$

$$T_{s1,2z} = -K_{s1,2z}\Delta\psi_{1,2} - C_{s1,2z}(\omega_{2z} - \omega_{1z})$$

$$T_{s1,3x} = -K_{s1,3x}\Delta\phi_{1,3} - C_{s1,3x}(\omega_{3x} - \omega_{1x})$$

$$T_{s1,3y} = -K_{s1,3y}\Delta\theta_{1,3} - C_{s1,3y}(\omega_{3y} - \omega_{1y}) \tag{4-24}$$

$$T_{s1,3z} = -K_{s1,3z}\Delta\psi_{1,3} - C_{s1,3z}(\omega_{3z} - \omega_{1z})$$

$$T_{s2,4x} = -K_{s2,4x}\Delta\phi_{2,4} - C_{s2,4x}(\omega_{4x} - \omega_{2x})$$

$$T_{s2,4y} = -K_{s2,4y}\Delta\theta_{2,4} - C_{s2,4y}(\omega_{4y} - \omega_{2y}) \tag{4-25}$$

$$T_{s2,4z} = -K_{s2,4z}\Delta\psi_{2,4} - C_{s2,4z}(\omega_{4z} - \omega_{2z})$$

$$T_{s3,5x} = -K_{s3,5x}\Delta\phi_{3,5}-C_{s3,5x}(\omega_{5x}-\omega_{3x})$$

$$T_{s3,5y} = -K_{s3,5y}\Delta\theta_{3,5}-C_{s3,5y}(\omega_{5y}-\omega_{3y}) \qquad (4\text{-}26)$$

$$T_{s3,5z} = -K_{s3,5z}\Delta\psi_{3,5}-C_{s3,5z}(\omega_{5z}-\omega_{3z})$$

4.1.5 Rotational State Equations

The rotational equations of motion, (4-1) and the Euler angle rate equations (4-18) through (4-22), may be transformed to scalar state variable form as follows:

<u>Definition of State Variables</u>

$$
\begin{aligned}
YO_1 &= \omega_{1x}\\
YO_2 &= \omega_{1y}\\
YO_3 &= \omega_{1z}\\
YO_4 &= \omega_{2x}\\
YO_5 &= \omega_{2y}\\
YO_6 &= \omega_{2z}\\
YO_7 &= \omega_{3x}\\
YO_8 &= \omega_{3y}\\
YO_9 &= \omega_{3z}\\
YO_{10} &= \omega_{4x} \qquad (4\text{-}27)\\
YO_{11} &= \omega_{4y}\\
YO_{12} &= \omega_{4z}\\
YO13 &= \omega_{5x}
\end{aligned}
$$

$YO_{14} = \omega_{5y}$

$YO_{15} = \omega_{5z}$

$YO_{16} = \Delta\phi_{2,4}$

$YO_{17} = \Delta\theta_{2,4}$

$YO_{18} = \Delta\psi_{2,4}$

$YO_{19} = \Delta\phi_{3,5}$

$YO_{20} = \Delta\theta_{3,5}$

$YO_{21} = \Delta\psi_{3,5}$

$YO_{22} = \Delta\phi_{1,2}$

$YO_{23} = \Delta\theta_{1,2}$

$YO_{24} = \Delta\psi_{1,2}$

$YO_{25} = \Delta\phi_{1,3}$

$YO_{26} = \Delta\theta_{1,3}$

$YO_{27} = \Delta\psi_{1,3}$

$YO_{28} = \phi_1$

$YO_{29} = \theta_1$

$YO_{30} = \psi_1$

$$\underline{YO}_1 = (YO_1,\ YO_2, ----,\ YO_{15})^T \tag{4-28}$$

$$\underline{YO}_2 = (YO_{16},\ YO_{17}, ----,\ YO_{30})^T \tag{4-29}$$

$$FT_i = C_i \quad i=1,2,---,15 \tag{4-30}$$

$$\underline{FT} = (FT_1,\ FT_2\ ---,\ FT_{15})^T \tag{4-31}$$

Using the state variable definitions in (4-27), the right hand sides of (4-18) through (4-22) may be written in the following form:

$$D_i = YO_{i-6} - YO_{i-12}; \quad i = 16,\ 17, --- 21 \qquad (4\text{-}32)$$

$$D_i = YO_{i-18} - YO_{i-21}; \quad i = 22, 23, 24 \qquad (4\text{-}33)$$

$$D_i = YO_{i-18} - YO_{i-24}; \quad i = 25, 26, 27 \qquad (4\text{-}34)$$

$$D_i = YO_{i-27}; \quad i = 28, 29, 30 \qquad (4\text{-}35)$$

Substitution of (4-27) through (4-31) into (4-1) yields the following:

$$\underline{\dot{YO}}_1 = A^{-1}\underline{FT} \qquad (4\text{-}36)$$

where

$$A = \begin{bmatrix} a_{1,1} & \cdots & a_{1,15} \\ \vdots & & \vdots \\ a_{15,1} & \cdots & a_{15,15} \end{bmatrix} \qquad (4\text{-}37)$$

With the substitution,

$$A^{-1} = \begin{bmatrix} b_{1,1} & \cdots & b_{1,15} \\ \vdots & & \vdots \\ b_{15,1} & \cdots & b_{15,15} \end{bmatrix} \qquad (4\text{-}38)$$

(4-36) may be written in the following form.

$$\dot{YO}_i = \sum_{J=1}^{15} b_{i,j} FT_j (\underline{YO}_1, \underline{YO}_2); \; i = 1,2,\text{---}15 \qquad (4\text{-}39)$$

Substitution of (4-27, (4-29) and (4-32) through (4-35) into (4-18) through (4-22) yields the following form of the Euler rate equations.

$$\dot{YO}_i = D_i (\underline{YO}_1, \underline{YO}_2); \quad i = 16, 17,\text{---}30 \qquad (4\text{-}40)$$

The set of equations (4-39) and 4-40) constitutes the scalar rotational state equations for the discrete mass mathematical model of SCB Configuration 1. This set of equations is linear and coupled in the state variables, YO_i. Since A is a constant matrix, A^{-1} is also and each YO_i is a linear function of the scalar components of $\underline{YO}_1$ and $\underline{YO}_2$.

4.2 APPLICATION OF MULTILEVEL CONTROL TECHNIQUES TO A LINEARIZED DISCRETE MASS MODEL

The overall approach utilized in applying multilevel control techniques was outlined in a memorandum by Chichester (4-6) as follows:

1. Decompose mathematical model into a set of decoupled equations.

2. Construct performance index and form Hamiltonian.

3. Develop costate equations with associated coordination equations.

4. Develop control algorithm.

5. Construct subproblem hierarchy.

6. Discretize equations of each subproblem.

4.2.1 Decomposition

The first step in the application of multilevel control techniques to a system in coupled state variable form is the decomposition of the model to temporarily suppress the coupling between the equations of which it is comprised. With the omission of external and actuator torque terms, (4-40) may be written in the following form:

$$\dot{YO}_i = DTS_i * YO_i + TSC_i(YO_k), k \neq i\ , i = 1, 2, ---15 \quad (4\text{-}41)$$

where:

$$DTS_i = \sum_{j=1}^{15} b_{i,j} \frac{\partial FT_j}{\partial YO_i} \qquad (4\text{-}42)$$

$$TSC_i = \sum_{j=1}^{15} b_{i,j} \sum_{\substack{k=1 \\ k \neq i}}^{27} \frac{\partial FT_j}{\partial YO_k} *YO_k$$

$$\sum_{\substack{k=1 \\ k \neq i}}^{27} DTSC_{i,k}\ YO_k \qquad (4\text{-}43\ )$$

$$DTSC_{i,k} = \frac{\partial TSC_i}{\partial YO_k} = \sum_{j=1}^{15} b_{i,j} \frac{\partial FT_j}{\partial YO_k} \qquad (4\text{-}44)$$

From (4-17) and (4-23) through (4-27) it is evident that the partial derivatives in (4-42) and (4-43) are constants that can be determined.

All of the coupling terms in (4-39) are summed in (4-43). The rotational state coordination variables may thus be defined as follows:

$$D_i = \sum_{\substack{k=1 \\ k \neq i}}^{27} DTSC_{i,k} *YO_k \qquad i = 1,\ 2,---15 \qquad (4\text{-}45)$$

With the external and actuator torque terms restored, the decomposed form of the first 15 rotational state equations may be written in the following form:

$$\dot{YO}_i = DTS_i *YO_i + D_i + \sum_{j=1}^{15} b_{ij} (T_{ej}+T_{aj}) \qquad (4\text{-}46)$$

From (4-32) through (4-35)

$$\frac{\partial D_i}{\partial YO_i} = 0 \quad \text{for } i = 16, 17, --, 30. \qquad (4\text{-}47)$$

Hence, (4-40) is in decomposed form with D_i as state coordination variables. The rotational scalar state equations are given by (4-39) and (4-40) with the corresponding state coordination equations (4-32) through (4-35) and (4-45).

4.2.2 Performance Index For The Linearized Model of SCB Configuration 1 With Control Torque Applied Only To Body 1.

For:

$$TA_1 = T_{a1x}$$

$$TA_2 = T_{a1y} \qquad (4\text{-}48)$$

$$TA_3 = T_{a1z}$$

$$P = \sum_{i=1}^{6} \int_{t_o}^{t_f} p_i dt \qquad (4\text{-}49)$$

$$p_i = W_i*(YO_i)^2 + W_{i+6}*(TA_i)^2 \quad i = 1, 2, 3 \qquad (4\text{-}50)$$

$$p_i = W_i * (YO_{i+24} - YO^*_{i+24})^2 \quad i = 4, 5, 6 \qquad (4\text{-}51)$$

where:

W_i and W_{i+6} are scalar weighting constants to be selected

YO^*_{i+24} are specified optimal values of YO_{i+24} for i = 4,5,6

4.2.3 Hamiltonian for Linearized Model of SCB Configuration 1 With Control Applied Only to Body 1

$$TE_1 = T_{e1x}$$

$$TE_2 = T_{e1y} \qquad (4\text{-}52)$$

$$TE_3 = T_{e1z}$$

$$H = \sum_{i=1}^{6} H_i \qquad (4\text{-}53)$$

$$\begin{aligned} H_i &= W_i(YO_i)^2 + W_{i+6}(TA_i)^2 \\ &\quad + \lambda_i(DTS_i * YO_i + D_i^* + \sum_{j=1}^{15} b_{i,j} T_{ej} + \sum_{j=1}^{3} b_{ij} T_{aj}) \\ &\quad + \beta_i (YO_i - YO^*_i) \qquad i = 1, 2, 3 \qquad (4\text{-}54) \end{aligned}$$

where:

$$D_i^* = \sum_{\substack{k=1 \\ k\neq i}}^{27} DTSC_{i,k} * YO_k^* \qquad i = 1, 2, 3 \qquad (4\text{-}55)$$

$$H_i = W_i \, (YO_{i+24}-YO^*_{i+24})^2 + \lambda_i \, D^*_{i+24} \quad i = 4, 5, 6 \quad (4\text{-}56)$$

$$D_i^* = YO^*_{i-27} \qquad i = 28, 29, 30 \qquad (4\text{-}57)$$

4.2.4 Costate Equations For Linearized Model of SCB Configuration 1

$$\dot{\lambda}_i = -\frac{\partial H}{\partial YO_i}$$

$$= -DTS_i*\lambda_i-2W_i*YO_i-\beta_i \qquad i = 1, 2, 3 \qquad (4\text{-}58)$$

$$\lambda_i(t_f) = 0 \qquad i = 1, 2, 3$$

$$\dot{\lambda}_i = -\frac{\partial H}{\partial YO_i} \qquad (4\text{-}59)$$

$$= 2W_i(YO^*_{i+24}-YO_{i+24}) \qquad i = 4, 5, 6$$

$$\lambda_i(t_f) = 0 \qquad i = 4, 5, 6$$

4.2.5 Control Equations For Linearized Model of SCB Configuration 1

$$(TA_i)_{r+1} = (TA_i)_r - q_i \left(\frac{\partial H}{\partial TA_i}\right)_r \qquad (4\text{-}60)$$

$$\frac{\partial H}{\partial TA_i} = 2W_{i+6}*TA_i + \sum_{j=1}^{3} b_{j;i}\,\lambda_j \qquad i = 1,\ 2,\ 3 \qquad (4\text{-}61)$$

where:

q_i = scalar weighting coefficients
r = subscript identifying iteration number
λ_i = ith costate variable

4.2.6 Additional Necessary Conditions for Linearized System

$$\frac{\partial H}{\partial \beta_i} = 0:\ YO_i = YO_i^* \qquad i = 1,\ 2,\ 3 \qquad (4\text{-}62)$$

$$\frac{\partial H}{\partial YO_i^*} = \sum_{\substack{j=1\\ j\neq i}}^{3} \lambda_j \frac{\partial D_j^*}{\partial YO_i^*} + \sum_{\substack{j=4\\ j\neq i}}^{6} \lambda_j \frac{\partial D_{j+24}^*}{\partial YO_i^*} - \beta_i = 0$$

$$\beta_i = \sum_{\substack{j=1\\ j\neq i}}^{3} DTSC_{j,i}\lambda_j + \lambda_{i+3} \qquad i = 1,\ 2,\ 3 \qquad (4\text{-}63)$$

$$\frac{\partial H}{\partial YO_i^*} = 2W_i*(YO_i - YO_i^*) = 0; \quad i = 28,\ 29,\ 30 \qquad (4\text{-}64)$$

$$\therefore\ YO_i^* = YO_i \qquad i = 28,\ 29,\ 30 \qquad (4\text{-}65)$$

4.2.7 Summary of Coordination Equations for Linearized Model

$$D_i = \sum_{\substack{k=1\\ k\neq i}}^{27} DTSC_{i,k}*YO_k \qquad i = 1,\ 2,\ ---,\ 15 \quad (4\text{-}46)$$

$$D_i = YO_{i-6} - YO_{i-12} \qquad i = 16, 17, ---, 21 \qquad (4\text{-}32)$$

$$D_i = YO_{i-18} - YO_{i-21} \qquad i = 22, 23, 24 \qquad (4\text{-}33)$$

$$D_i = YO_{i-18} - YO_{i-24} \qquad i = 25, 26, 27 \qquad (4\text{-}34)$$

$$D_i = YO_{i-27} \qquad i = 28, 29, 30 \qquad (4\text{-}35)$$

$$\beta_i = \sum_{\substack{j=1 \\ j \neq i}}^{3} DTSC_{j,i}\lambda_j + \lambda_{i+3} \qquad i = 1, 2, 3 \qquad (4\text{-}63)$$

4.2.8 Vector Representation of Variables for Linearized Model of SCB Configuration 1 With Control Applied Only to Body 1

$$\underline{YO} = (YO_1, YO_2, ---, YO_{30})^T$$

$$\underline{D} = (D_1, D_2, --- D_{30})^T$$

$$\underline{TA} = (TA_1, TA_2, TA_3)^T \qquad (4\text{-}66)$$

$$\underline{TE} = (TE_1, TE_2, ---, TE_{15})^T$$

$$\underline{\lambda} = (\lambda_1, \lambda_2, ---, \lambda_6)^T$$

$$\underline{\beta} = (\beta_1, \beta_2, \beta_3)^T$$

$$\underline{YO}^* = (YO^*_{28}, YO^*_{29}, YO^*_{30})^T$$

The subproblem hierarchy for the linearized discrete mass state variable rotational model of the Space Construction Base is depicted in Figure 4-2.

4.3 APPLICATION OF MULTILEVEL CONTROL TECHNIQUES TO A HYBRID COORDINATE MODEL

An important objective implicit in the construction of a mathematical model for the rotation and flexure of Configuration 1 of the SCB is the development of technique that may be readily extended to successively larger configurations involving greater numbers of rigid bodies. The complexity and high dimension resulting from a discrete mass modeling of Configuration 1 in Section 4.1 motivated a search for a mathematical modeling approach that would yield a model of less complexity and smaller dimension. Linearization of the discrete mass model attained a reduction of complexity but not a reduction of dimension of the model. Hybrid coordinate modeling, an approach developed by Likins (4-7), was seen to offer promise of both linearization and reduction of dimension of the resulting model. To evaluate the efficacy of this approach a single axis torsional space vehicle was modeled in terms of hybrid coordinates and subjected to multilevel control techniques. The results of this particular study were published in a paper by Chichester, Kaczynski and Nachmias (4-8).

4.3.1 Discrete Rigid Body Model of a Spacecraft

The vehicle to be controlled is shown in Figure 4-1. It consists of a central body with appendages such as solar panels along each direction of the Z axis. Because of

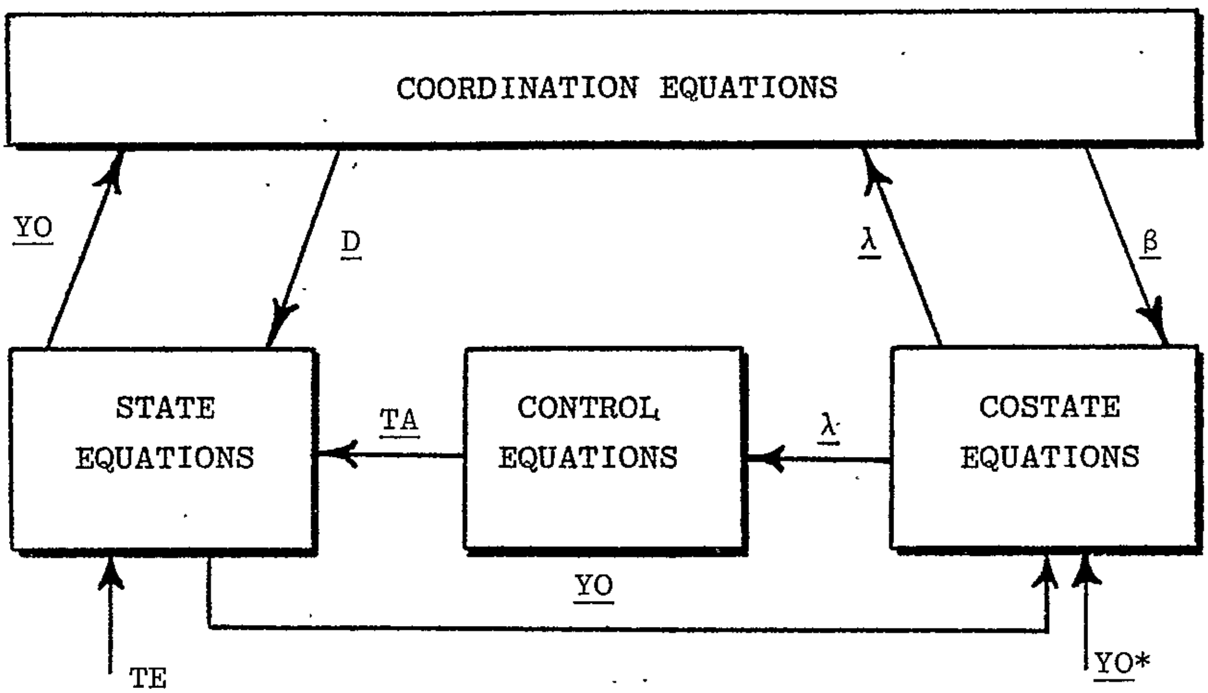


FIGURE 4-2

SUBPROBLEM HIERARCHY FOR LINEARIZED
SPACE CONSTRUCTION BASE
ROTATIONAL MODEL WITH MULTILEVEL CONTROL

symmetry, the five bodies of Figure 1 may be represented by three masses, following Porcelli (4-9) as depicted in Figure 4-3. The equations of motion for the vehicle are the following:

$$J_0\ddot{\theta}_0 = -K_1(\theta_0-\theta_1)+ T_0$$

$$J_1\ddot{\theta}_1 = K_1(\theta_0-\theta_1) - K_2(\theta_1-\theta_2) \qquad (4\text{-}67)$$

$$J_2\ddot{\theta}_2 = K_2(\theta_1-\theta_2)$$

where: θ_i = angular rotation of the ith body relative to an inertial frame of reference

T_i = disturbance or control torque on ith body

J_i = moment of inertia of ith body about the Z-axis

K_i = torsional spring constant for spring between bodies i-1 and i

4.3.2 Hybrid Coordinate Model

The standard form of the hybrid coordinate model of the vehicle described in (4-67) may be written as follows:

$$J_t\ddot{\theta}_0-\delta^T\ddot{\underline{\eta}} = T_0$$

$$\ddot{\underline{\eta}} + \left[2\zeta\sigma\right]\dot{\underline{\eta}} + \left[\sigma^2\right]\underline{\eta}-\delta\ddot{\theta}_0 = 0 \qquad (4\text{-}68)$$

where: ζ = structural damping (same for all modes)

$\left[2\zeta\sigma\right] = 2\zeta\left[\sigma\right]$, where $\left[\sigma\right]$ is a diagonal matrix of modal frequencies.

$\eta = \phi^{-1}q$ = vector of modal coordinates.

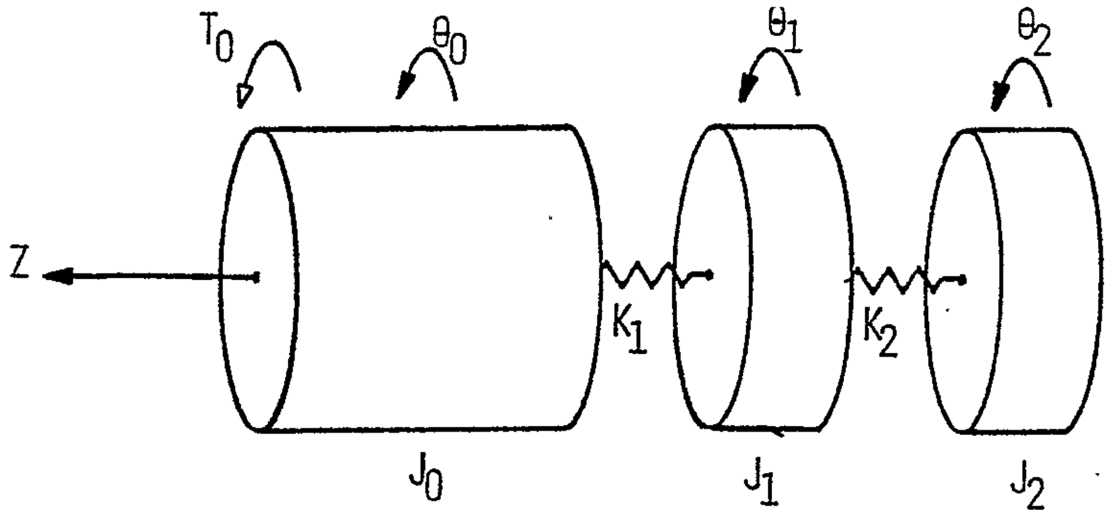


FIGURE 4-3 TORSIONAL MODEL OF THE VEHICLE

$$\underline{q} = \begin{bmatrix} q_1 q_2 \end{bmatrix}^T \qquad (4\text{-}69)$$

$$q_i = \theta_i - \theta_0 \qquad (4\text{-}70)$$

$$\phi^T \begin{bmatrix} K \end{bmatrix} \phi = \begin{bmatrix} \sigma^2 \end{bmatrix}$$

$$\begin{bmatrix} \sigma^2 \end{bmatrix} = \begin{bmatrix} \sigma_1^{\,2} & 0 \\ 0 & \sigma_2^{\,2} \end{bmatrix}$$

$$\begin{bmatrix} J \end{bmatrix} = \begin{bmatrix} J_1 & 0 \\ 0 & J_2 \end{bmatrix}; \begin{bmatrix} K \end{bmatrix} = \begin{bmatrix} (K_1+K_2) & -K_2 \\ -K_2 & K_2 \end{bmatrix}$$

$$\delta = -\phi^T \begin{bmatrix} J \end{bmatrix} \begin{bmatrix} 1 \\ 1 \end{bmatrix} = -\phi^T \begin{bmatrix} J_1 \\ J_2 \end{bmatrix}$$

$J_t = J_o + J_1 + J_2$ = total vehicle moment of inertia

4.3.3 Decomposed Hybrid Coordinate Model

Expansion of equation set (4-68) into its scalar components, the substitutions $X_1 = \theta_0$, $X_2 = \dot{\theta}_0$, $X_3 = \eta_1$, $X_4 = \dot{\eta}_1$, $X_5 = \eta_2$, $X_6 = \dot{\eta}_2$ and the simultaneous solution of the resulting equations for X_i, i=1,2,----,6, generate a coupled state variable hybrid coordinate model of the vehicle to be controlled. State coordination equations that temporarily suppress coupling between the scalar equations of the state variable model may be written in the following form.

$$C_i = g_i(X_c); \quad i=1,2...,6^* \tag{4-71}$$

where: $$X_c = \left[X_1,..,X_{i-1},X_{i,1},...,X_6\right]^T \tag{4-72}$$

The resulting scalar equations of the decomposed (decoupled) state variable hybrid coordinate model are the following:

$$\dot{X}_i = f_i(X_i)+u_i(T_0)+C_i \tag{4-73}$$

where: $$X_i(t_0) = X_{i0} \tag{4-74}$$

4.3.4 Decomposed Performance Index and Hamiltonian

When the mathematical model of the vehicle to be controlled is decomposed into subsystems, the corresponding decomposed performance index may be written in the form of a summation of terms each of which corresponds to one of the subsystems of the decomposed model. The decomposed Hamiltonian resulting from such a performance index also may be written in summation form. For the flexible vehicle treated here the decomposed Hamiltonian may be written as follows:

$$H = \sum_{i=1}^{6} H_i \tag{4-75}$$

where: $$H_i = p_i+\lambda_i(f_i+u_1+C_i)+\rho_i(g_i-C_i) \tag{4-76}$$

*This range for the subscript, i, will apply in the sequel unless a specific exception is stated.

$$p_i = W_{i,1}(X_i - X_{isp})^2 + W_{i,2}u_i^2 \tag{4-77}$$

$W_{i,j}$ = constant weighting coefficients

λ_i = costate variable for subsystem i

ρ_i = Lagrange multiplier for the coordination constraint, equation (4-71).

4.3.5 Costate and Costate Coordination Equations

Necessary conditions for effecting optimal control are stated in terms of partial derivatives of the Hamiltonian. Two such conditions for the flexible vehicle treated in this section may be stated as follows:

$$\dot{\lambda}_i = \frac{-\partial H}{\partial X_i} \tag{4-78}$$

$$\frac{\partial H}{\partial C_i} = 0 \tag{4-79}$$

The first of these conditions generates the following costate equations.

$$\dot{\lambda}_i = -\frac{\partial p_i}{\partial X_i} - \frac{\partial f_i}{\partial X_i}\lambda_i - \sum_{\substack{j=1 \\ j\neq i}}^{6} \frac{\partial g_j}{\partial X_i}\rho_j \tag{4-80}$$

where: $\lambda_i(t_f) = 0$ (4-81)

The second generates the costate coordination equations which follow:

$$\rho_i = \lambda_i \tag{4-82}$$

4.3.6 The Control Algorithm

The iterative relationship for successive values of the control torque may be expressed as follows:

$$(T_0)_{r+1} = (T_0)_r - q\left(\frac{\partial H}{\partial T_0}\right)_r \qquad (4\text{-}83)$$

where r is the iteration index and q is a constant to be chosen on the basis of the rate of approach of the performance of the controlled vehicle to optimality. From (4-73), (4-76) and (4-77) it may be seen that the partial derivative in (4-83) is a function of λ_i.

4.3.7 Construction of the Subproblem Hierarchy

The state equations, (4-73) and also (4-74) may be regarded as comprising a state subproblem. Similarly, the costate equations (4-80) and (4-81) may be assembled into a costate subproblem, and the control equations (4-83) may be associated in a control subproblem. The state coordination equations (4-71) and the costate coordination equations (4-82) may be combined into an overall coordination subproblem. Then a hierarchy of these subproblems can be assembled as depicted in Figure 4-4.

4.4 CONCLUSIONS AND RECOMMENDATIONS

From the work reported in Subsections 4.1 through 4.3, the following conclusions may be drawn:

1) The three dimensional five body discrete mass rotational model for Configuration 1 of the SCB has been transformed in such a way that it may readily be simulated on a digital computer. The resulting

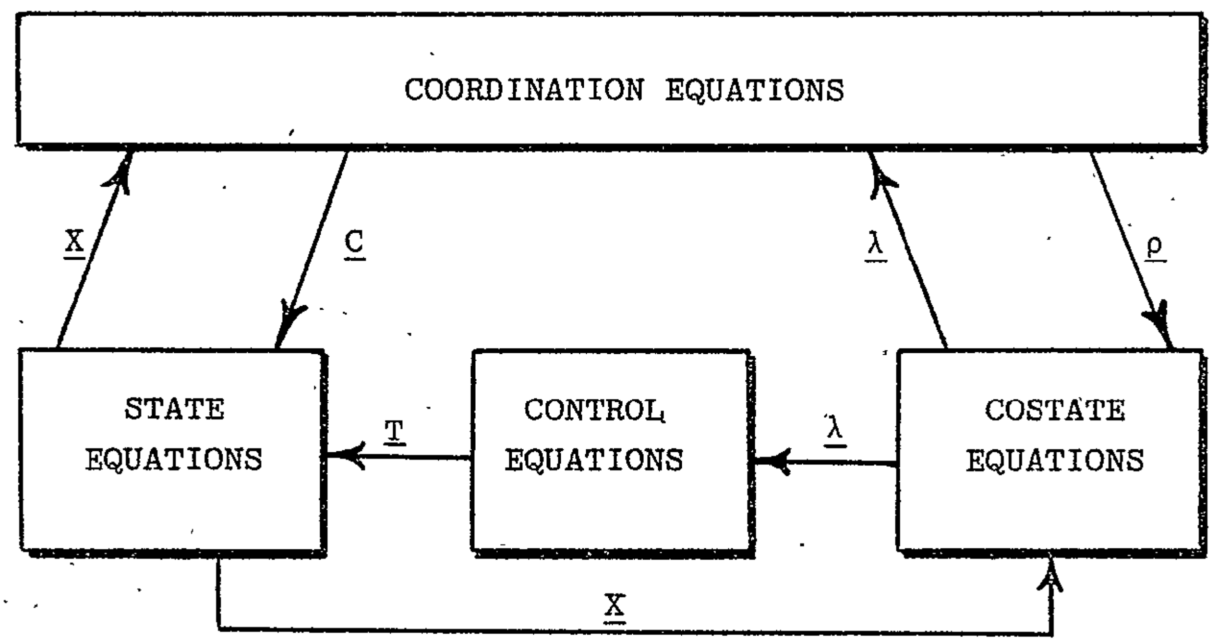


FIGURE 4-4
SUBPROBLEM HIERARCHY FOR
MULTILEVEL CONTROL

model is in scalar state variable form.

2) Multilevel control techniques have been applied to the scalar state variable form of the three dimensional discrete mass model for Configuration 1. The resulting hierarchy of subproblems to be solved may be easily simulated on a digital computer.

3) The multilevel hierarchical rotational form of the three dimensional discrete mass model for Configuration 1 of the SCB is nonlinear and of relatively high dimension. (30 scalar state variables) The remaining 11 Configurations would require discrete mass rotational models of still higher dimension. (Up to 120 state variables)

4) The nonlinear discrete mass rotational models of Configuration 1 of the SCB have been linearized using the assumption of small angular displacements.

5) Hybrid coordinate modeling appears to yield models that are lower in dimension than the corresponding models generated by the discrete mass approach. Hybrid coordinate models also tend to be linear in most instances. Both of these factors render the model more amenable to the application of multilevel control techniques.

6) In extending the combined application of hybrid coordinate modeling and multilevel control techniques from models of low dimension to models of higher

dimension, some of the modal coordinates of the hybrid model should be truncated.

The following recommendations are offered for further work in the application of multilevel control to flexible space vehicles and the computer simulation of the resulting mathematical models.

1) Simulation of the linearized scalar state variable form of the three dimensional discrete mass rotational model of Configuration 1 of the SCB should be completed.

2) A three dimensional hybrid coordinate rotational model of Configuration 1 of the SCB with multilevel control should be developed for digital computer simulation.

3) Candidate control techniques other than multilevel control should be applied to either of the three dimensional rotational model simulations listed above for purposes of comparison.

4) Since most of the candidate control techniques presently contemplated require access tc all of the state variables, techniques for generation of observers required to sythesize inaccessible state variables should be developed.

5) Modeling, control and simulation techniques developed for Configuration 1 rotational models of the SCB

should be extended to other Configurations involving more masses.

4.5 REFERENCES

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SECTION 5

5.0 SIMULATION OF LQR CONTROL

The linear quadratic regulator (LQR) approach is applied to single axis control of Configuration 1 of the Space Construction Base (SCB). A single axis vehicle model is defined and converted to the state variable form for application of the LQR technique. A control performance index is then defined and weighting factors are selected. A matrix Riccati equation for the system is then solved as a function of time. This result is used to specify the optimal feedback gain coefficients. These feedback gains were used in a simulation of the vehicle control system, and the time responses are presented. A description of an alternate application of LQR is then discussed.

5.1 VEHICLE EQUATIONS

Configuration 1 of the SCB (References 5-1 and 5-2) is shown in Figure 5-1. The vehicle XYZ axes are parallel to the principal axes of inertia. The vehicle is represented here by discrete masses with three-axis hinge springs between adjacent masses. The vehicle is divided into five masses: one central body between the solar wings, and each solar wing is divided into two equal masses. Because of the symmetry and the absence of product of inertia terms, the SCB can be represented as a three-mass rotational model as shown in Figure 5-2. Body 1 is the central body; both inboard solar wing sections are represented as body 2 and both outboard sections as body 3. Module and solar wing dimensions and the inertia properties were obtained from Reference 5-1. Center of mass locations are given in Figure 5-2 relative to the reference origin for the XYZ coordinates. $\bar{x}_1$ is the center of mass (CM) location

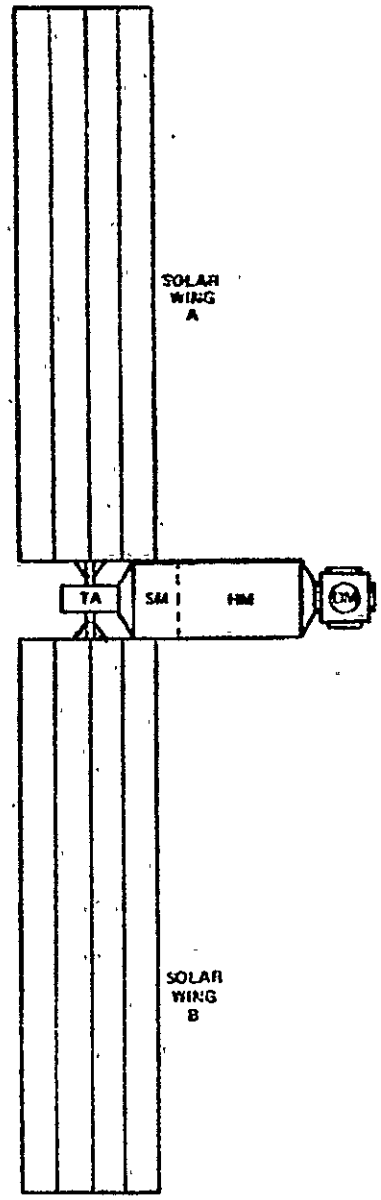

FIGURE 5-1

SPACE CONSTRUCTION BASE-CONFIGURATION 1

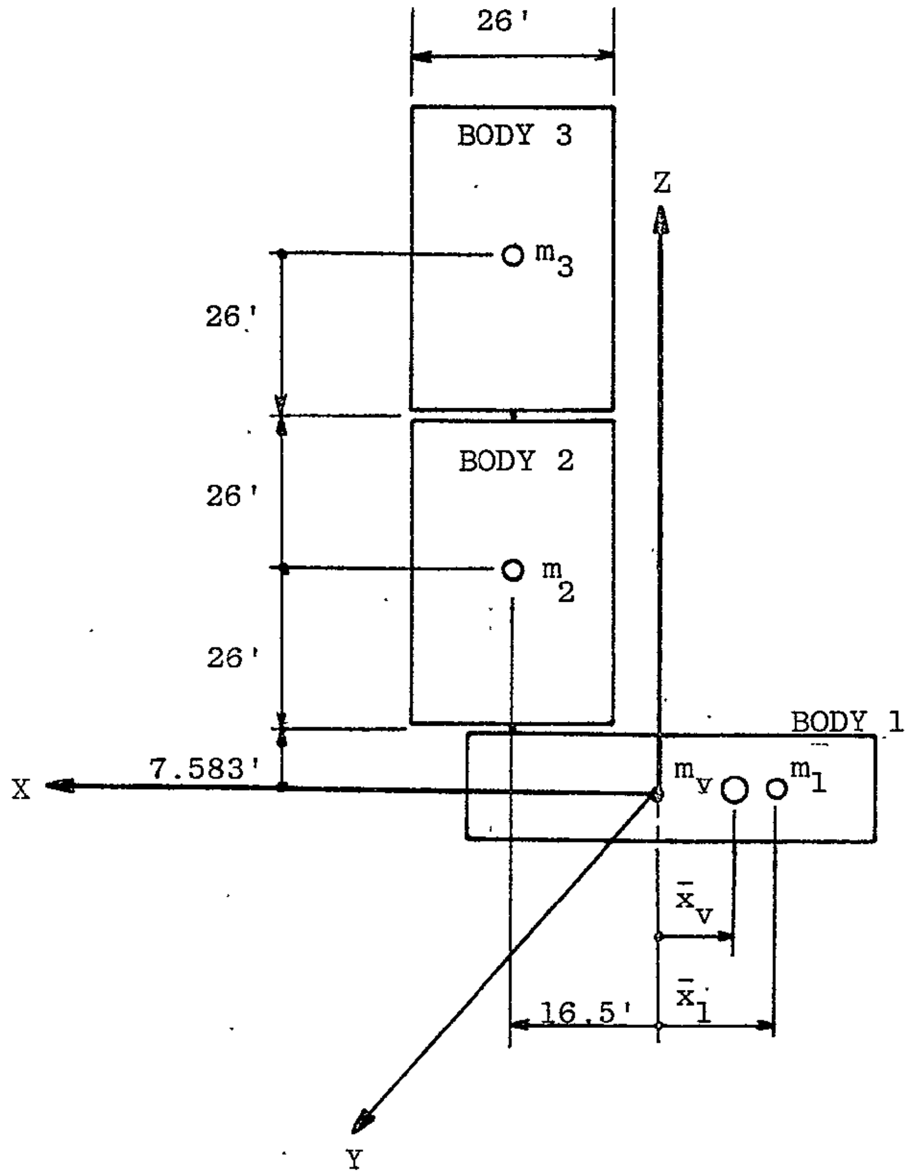

FIGURE 5-2
INERTIA MODEL FOR CONFIGURATION 1

of body 1 along the X axis and $\bar{x}_v$ is the CM of the total vehicle.

With the vehicle modeling limited to the Z axis, the inertia characteristics of the central body (No. 1) are listed in Table 5-1. Key outputs of the table are the CM location and the Z axis moment of inertia about the CM for body 1. It is convenient to represent the single axis vehicle as the torsional model (as in Reference 5-3) of Figure 5-3, where the masses are connected by hinge springs K_1 and K_2. For the Z axis,

$$J_1 = I_1 + \frac{m_1}{m}(m_2 + m_3) R_{12}^2 \qquad (5\text{-}1)$$

where J_1 = effective MOI of body 1

I_1 = MOI of body 1 about it's CM

m_i = mass of the i-th body

$m = m_1 + m_2 + m_3$

R_{12} = distance from the CM of body 1 to the contact point with body 2 (the X axis component only in this case)

The MOI of bodies 2 and 3 are obtained by assuming that each solar wing section is a rectangular plane. The MOI about the Z axis of each is then

TABLE 5-1

INERTIA CHARACTERISTICS OF BODY 1

- $\bar{x}_1 = \Sigma W_i x_i / \Sigma W_i = -88.74'' = -7.40'$

MODULE	WEIGHT (LBS)	POSITION (IN)			RAD. OF GYRATION (IN)	POSITION WRT CM (IN)	MOMENT OF INERTIA WRT CM (SLUG-FT^2)
	W	x	y	z	K_z	$x - \bar{x}_1$	I_1
SM	16,440.	66	0	0	57.8	+154.7	96,757.6
HM	16,487.	-156.	0	0	100.	-67.3	51,693.7
TA	650.	198.	0	0	43.5	+286.7	11,795.2
DM	5,625.	-377.	0	0	55.1	-288.3	104,578.9
TOTAL	39,202						264,825.

SM - Subsystems Module

HM - Habitability Module

TA - Turret Assembly

$$I_1 = \frac{w}{g}\left[K_z^2 + (x-\bar{x}_1)^2\right]$$

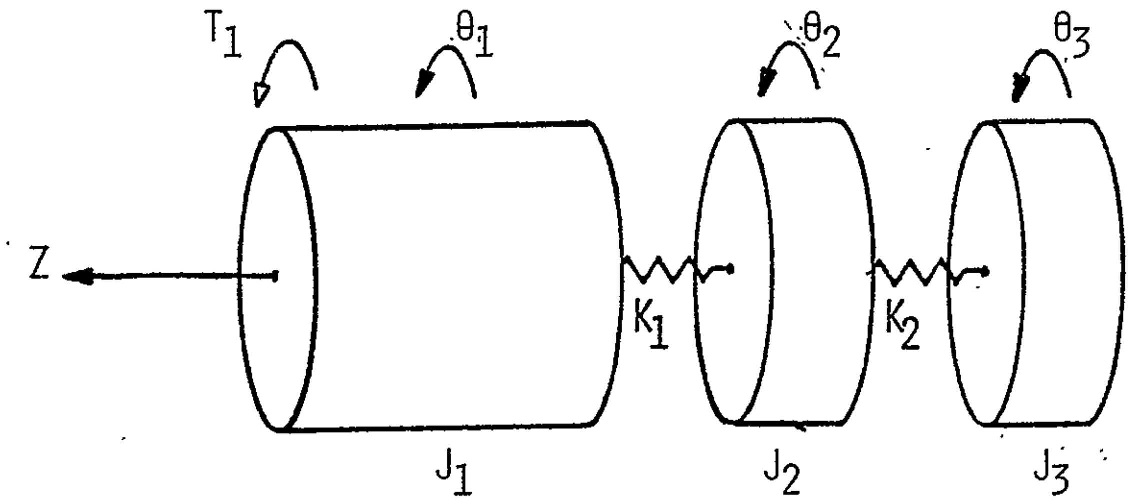

FIGURE 5-3 TORSIONAL MODEL OF THE VEHICLE

$$I_2 = I_3 = (26)^2\ 26.445/12 = 1490 \text{ slug-ft}^2 \text{ and}$$

$$J_2 = I_2 \text{ and } J_3 = I_3.$$

Note that the mass of each section is doubled since it represents both inboard or both outboard portions of the solar wings.

The equations of motion for the torsional model (Reference 5-4) are then defined as

$$J\underline{\ddot{\theta}} = \text{sum of constraint and disturbance torques} \tag{5-2}$$

$$\text{where } J = \begin{bmatrix} J_1 & 0 & 0 \\ 0 & J_2 & 0 \\ 0 & 0 & J_3 \end{bmatrix} \tag{5-3}$$

$$\underline{\ddot{\theta}} = \begin{bmatrix} \ddot{\theta}_1 & \ddot{\theta}_2 & \ddot{\theta}_3 \end{bmatrix}^T \tag{5-4}$$

Springs K_1 and K_2 and dampers D_1 and D_2 cause constraining torques, while the disturbance is limited to a control torque vector $\underline{u}$ with a component on each body. The equation in matrix form is then

$$J\underline{\ddot{\theta}} = D\underline{\dot{\theta}} + K\underline{\theta} + \underline{u} \tag{5-5}$$

$$\text{where } K = \begin{bmatrix} -K_1 & K_2 & 0 \\ K_1 & -(K_1+K_2) & K_2 \\ 0 & K_2 & -K_2 \end{bmatrix} \tag{5-6}$$

$$D = \begin{bmatrix} -D_1 & D_2 & 0 \\ D_1 & -(D_1+D_2) & D_2 \\ 0 & D_2 & -D_2 \end{bmatrix} \tag{5-7}$$

$$\underline{u} = \begin{bmatrix} u_1 & u_2 & u_3 \end{bmatrix}^T \tag{5-8}$$

and the $\underline{\theta}$ and $\underline{\dot{\theta}}$ vector are defined in a manner similar to $\underline{\ddot{\theta}}$. K_2 is selected to obtain a 1 rad/sec resonance with J_2,

$$K_2 = J_2 \, W^2 \tag{5-9}$$

K_1 is selected to be equal to K_2. D_2 is set to obtain a damping factor of 0.005 with K_2 and J_2 and D_1 is set equal to D_2. All numerical values are summarized in Table 5-2. Each matrix formed by these parameters is printed out on Figure 5-4.

To place the model in state variable form, both sides of the equation are premultiplied by J^{-1}

$$\underline{\ddot{\theta}} = J^{-1}D\underline{\dot{\theta}} + J^{-1}K\underline{\theta} + J^{-1}\underline{u} \tag{5-10}$$

This can be redefined as follows, while also setting $u_2 = u_3 = 0$:

$$\underline{\ddot{\theta}} = A_D\underline{\dot{\theta}} + A_K\underline{\theta} + B\underline{u} \tag{5-11}$$

Matrices J^{-1}, A_K, A_D and the transpose of B are printed out in Figure 5-5.

TABLE 5-2

SUMMARY OF PHYSICAL CONSTANTS

- Z AXIS OF CONFIGURATION 1
- R_{12} = (16.50 + 7.40)FT. = 23.9 FT ALONG X AXIS

	MASS	M.O.I. ABOUT EACH C.M.	EFFECTIVE M.O.I.	SPRING CONSTANT	DAMPING CONSTANT
i	M_i (slugs)	I_i $(\text{slug-ft})^2$	J_i $(\text{slug-ft})^2$	K_i (ft-lb/rad)	D_i (ft-lb-sec)
1	1218.21.	264,825.	293,767.	1490.	14.9
2	26.445	1490.	1490.	1490.	14.9
3	26.445	1490.	1490.	--	--

$$J_1 = I_1 + \frac{m_1}{m}(m_2+m_3)R_{12}^2$$

$$m = m_1 + m_2 + m_3$$

R_{12} = DISTANCE IN BODY 1 FROM IT'S CM TO POINT OF CONTACT WITH BODY 2

DAMPING SELECTED TO GIVE A DAMPING FACTOR OF 0.005.

J=	0.29377D 06	0.0	0.0
	0.0	0.14900D 04	0.0
	0.0	0.0	0.14900D 04

K=	-0.14900D 04	0.14900D 04	0.0
	0.14900D 04	-0.29800D 04	0.14900D 04
	0.0	0.14900D 04	-0.14900D 04

D=	-0.14900D 02	0.14900D 02	0.0
	0.14900D 02	-0.29800D 02	0.14900D 02
	0.0	0.14900D 02	-0.14900D 02

FIGURE 5-4 MATRIX PARAMETERS FOR DISCRETE INERTIA, SPRING AND DAMPING CONSTANTS

J INVERSE=	0.34041D-05	0.0	0.0
	0.0	0.67114D-03	0.0
	0.0	0.0	0.67114D-03

AK=	-0.50720D-02	0.50720D-02	0.0
	0.10000D 01	-0.20000D 01	0.10000D 01
	0.0	0.10000D 01	-0.10000D 01

AD=	-0.50720D-04	0.50720D-04	0.0
	0.10000D-01	-0.20000D-01	0.10000D-01
	0.0	0.10000D-01	-0.10000D-01

BT=	0.34041D-05	0.0	0.0

FIGURE 5-5 THE INVERSE OF INERTIA MATRIX, A_K, A_D AND B^T

The system can be redefined as

$$\dot{x} = Ax + Bu \quad (5\text{-}12)$$

where $x = \left[\theta_1 \; \dot{\theta}_1 \; \theta_2 \; \dot{\theta}_2 \; \theta_3 \; \dot{\theta}_3\right]^T \quad (5\text{-}13)$

and $u = u_1$

Then A is a recasting of A_K and A_D as follows:

$$A = \begin{bmatrix} 0 & 1 & 0 & 0 & 0 & 0 \\ -.5072E-2 & -.5072E-4 & .5072E-2 & .5072E-4 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & .01 & -2 & -.02 & 1 & .01 \\ 0 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & .01 & -1 & -.01 \end{bmatrix} \quad (5\text{-}14)$$

And the dimension of B is increased to six:

$$B^T = \begin{bmatrix} 0 & .34041E-5 & 0 & 0 & 0 & 0 \end{bmatrix} \quad (5\text{-}15)$$

5.2 OPTIMUM FEEDBACK GAIN

The linear optimum feedback control gain can be determined by setting a performance index (References 5-5, 5-6 and 5-7) as follows:

$$PI = \int_0^\infty (x^TQx + u^TRu)\, dt \quad (5\text{-}16)$$

where Q, R = weighting factor matrices.

The diagonal of Q is selected to indicate the relative importance of each element of x. In this case,

$$Q = \begin{bmatrix} q & 0 & 0 & 0 & 0 & 0 \\ 0 & & & & & \\ 0 & & & & & \\ 0 & & & \bigcirc & & \\ 0 & & & & & \\ 0 & & & & & \end{bmatrix} \tag{5-17}$$

where q is selected as $W_{BW}^4 = (0.1)^4 = 10^{-4}$, and W_{BW} is the control loop bandwidth. R is a 1 by 1, where $r = (J_1)^{-2}$

Once the model is placed in the state variable form

$$\dot{x} = Ax + Bu \tag{5-18}$$

the matrix Riccati equation which follows was solved until $\dot{P} = 0$:

$$\dot{P} = PA + A^TP - PBR^{-1}B^TP + Q \tag{5-19}$$

The LQR feedback matrix for these conditions is defined as

$$F = -R^{-1} B^T \overline{P} = -\left[F_1 \; F_2 \; F_3 \; F_4 \; F_5 \; F_6 \right] \tag{5-20}$$

where $\overline{P}$ is the steady state solution of (5-19).

A block diagram of the system is given in Figure 5-6. The input constants (Q, A, B, R) used in the solution

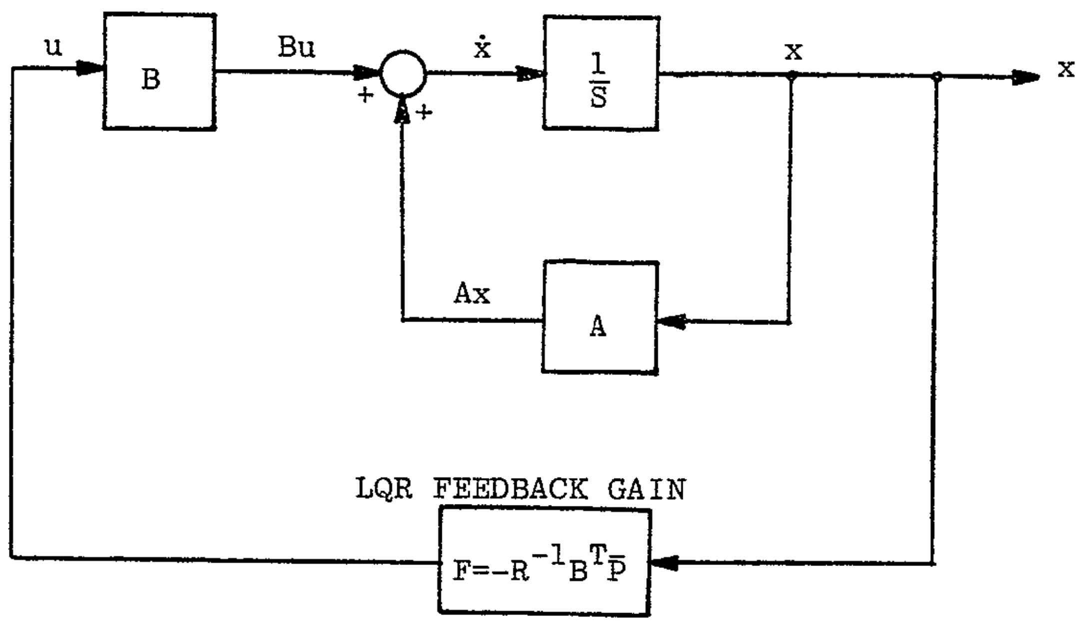

FIGURE 5-6

BLOCK DIAGRAM OF LQR-CONTROLLED SYSTEM

of the Riccati equation are given in Figure 5-7, along with the initial conditions which were used. Note that q and r were normalized with q = 1 and $r = (J_1^2\, W_{BW}^{\,4})^{-1}$. The final values of the solution, when $t \approx 200$ seconds, are shown in Figure 5-8. F is also printed out and the time solution provided the following component gains of F:

$$
\begin{aligned}
F_1 &= 2906. \\
F_2 &= 41320. \\
F_3 &= 15.0 \\
F_4 &= 209.3 \\
F_5 &= 15.1 \\
F_6 &= 209.1
\end{aligned}
\tag{5-20}
$$

It is interesting to note that:

$$
\begin{aligned}
F_1/J_1 &\cong W_{BW}^2 = (0.1\ \text{rad/sec})^2 \\
F_2/J_1 &\cong 2\zeta W_{BW} = 2\ (.707)\ (0.1)
\end{aligned}
\tag{5-21}
$$

Thus if the appendages were ignored, the same attitude and attitude rate gains would be obtained for central body feedback if a standard non-optimal servo technique was applied.

5.3 SIMULATION

The system was simulated on the digital computer using the full LQR feedback matrix for an initial attitude error of

SOLUTION OF MATRIX RICCATI EQUATION, SCB CONFIG 1, Z AXIS

CONSTANT DATA INPUT

Q=	0.100000D 01	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0

A=	0.0	0.100000D 01	0.0	0.0	0.0	0.0
	-0.50720D-02	-0.50720D-04	0.50720D-02	0.50720D-04	0.0	0.0
	0.0	0.0	0.0	0.100000D 01	0.0	0.0
	0.100000D 01	0.10000D-01	-0.20000D 01	-0.20000D-01	0.10000D 01	0.10000D-01
	0.0	0.0	0.0	0.0	0.0	0.10000D 01
	0.0	0.0	0.10000D 01	0.10000D-01	-0.10000D 01	-0.10000D-01

B=	0.0	0.34081D-05	0.0	0.0	0.0	0.0

R=	0.11600D-06

T=	0.0 SEC	F=	0.0	0.0	0.0	0.0	0.0	0.0
ITS=	1	P=	0.0	0.0	0.0	0.0	0.0	0.0
			0.0	0.0	0.0	0.0	0.0	0.0
			0.0	0.0	0.0	0.0	0.0	0.0
			0.0	0.0	0.0	0.0	0.0	0.0
			0.0	0.0	0.0	0.0	0.0	0.0
			0.0	0.0	0.0	0.0	0.0	0.0
		PDOT=	0.100000D 01	0.0	0.0	0.0	0.0	0.0
			0.0	0.0	0.0	0.0	0.0	0.0
			0.0	0.0	0.0	0.0	0.0	0.0
			0.0	0.0	0.0	0.0	0.0	0.0
			0.0	0.0	0.0	0.0	0.0	0.0
			0.0	0.0	0.0	0.0	0.0	0.0

FIGURE 5-7 SYSTEM MATRICES A AND B, WEIGHTING FACTORS Q AND R, AND INITIAL CONDITIONS FOR SOLUTION OF THE MATRIX RICCATI EQUATION.

T=	200.0 SEC	F=	0.29060D 04	0.41320D 05	0.14996D 02	0.20929D 03	0.15120D 02	0.20912D 03
ITS=	24	P=	0.13938D 02	0.99026D 02	0.68115D-01	0.49206D 00	0.66580D-01	0.48694D 00
			0.99026D 02	0.14080D 04	0.51100D 00	0.71319D 01	0.51523D 00	0.71260D 01
			0.68115D-01	0.51100D 00	0.13032D-02	0.25580D-02	0.18129D-02	0.25369D-02
			0.49206D 00	0.71319D 01	0.25580D-02	0.38566D-01	0.25944D-02	0.40016D-01
			0.66580D-01	0.51523D 00	0.18129D-02	0.25944D-02	0.27787D-02	0.25806D-02
			0.48694D 00	0.71260D 01	0.25369D-02	0.40016D-01	0.25806D-02	0.42436D-01
		PDOT=	0.64494D-06	-0.18513D-04	0.45576D-06	0.75309D-05	-0.10095D-05	0.11843D-04
			-0.18513D-04	0.86911D-04	0.64653D-05	-0.37108D-04	0.11246D-04	-0.59127D-04
			0.45576D-06	0.64653D-05	-0.42156D-06	-0.25362D-05	-0.48346D-07	-0.39768D-05
			0.75309D-05	-0.37108D-04	-0.25362D-05	0.15801D-04	-0.46611D-05	0.25161D-04
			-0.10095D-05	0.11246D-04	-0.48346D-07	-0.46611D-05	0.98620D-06	-0.73383D-05
			0.11843D-04	-0.59127D-04	-0.39768D-05	0.25161D-04	-0.73383D-05	0.40056D-04

FIGURE 5-8 "FINAL" CONDITIONS OF MATRIX RICCATI EQUATION SOLUTION AT TIME = 200 SECONDS

$$\underline{\theta}(0) = \begin{bmatrix} 1 \text{ degree} \\ 0 \\ 0 \end{bmatrix} \tag{5-22}$$

The θ_1, u, η_2 and η_3 variables are shown on print-plots of Figure 5-9 and 5-10, where:

$$\begin{aligned} \eta_2 &= \text{relative motion of inboard appendage} = \theta_2 - \theta_1 \\ \eta_3 &= \text{relative motion of outboard appendage} = \theta_3 - \theta_1 \end{aligned} \tag{5-23}$$

Since the central actuator is located at body 1, the θ_1 transient is well behaved. η_2 and η_3, however, oscillate at about 0.1 Hz and appear to be lightly damped. The control u also appears as a smooth transient - even though it is also dependent upon oscillatory states from bodies 2 and 3. All six states have been applied to minimize the performance index based upon the weighted integration of θ_1 and u.

To examine this further, the simulation was repeated with $F_3 = F_4 = F_5 = F_6 = 0$, since these gains were already very low in the optimal case. The result of this "partial LQR" feedback was basically the same as that obtained previously for θ_1, η_2 and η_3 (Figures 5-9 and 5-10). But the control torque u had a 0.1 Hz oscillatory component superimposed on the basic response obtained in Figure 5-9. These results are shown in Figures 5-11 and 5-12. Obviously, the performance index here is not minimal since the integral of the $u^T R u$ term would approach infinity.

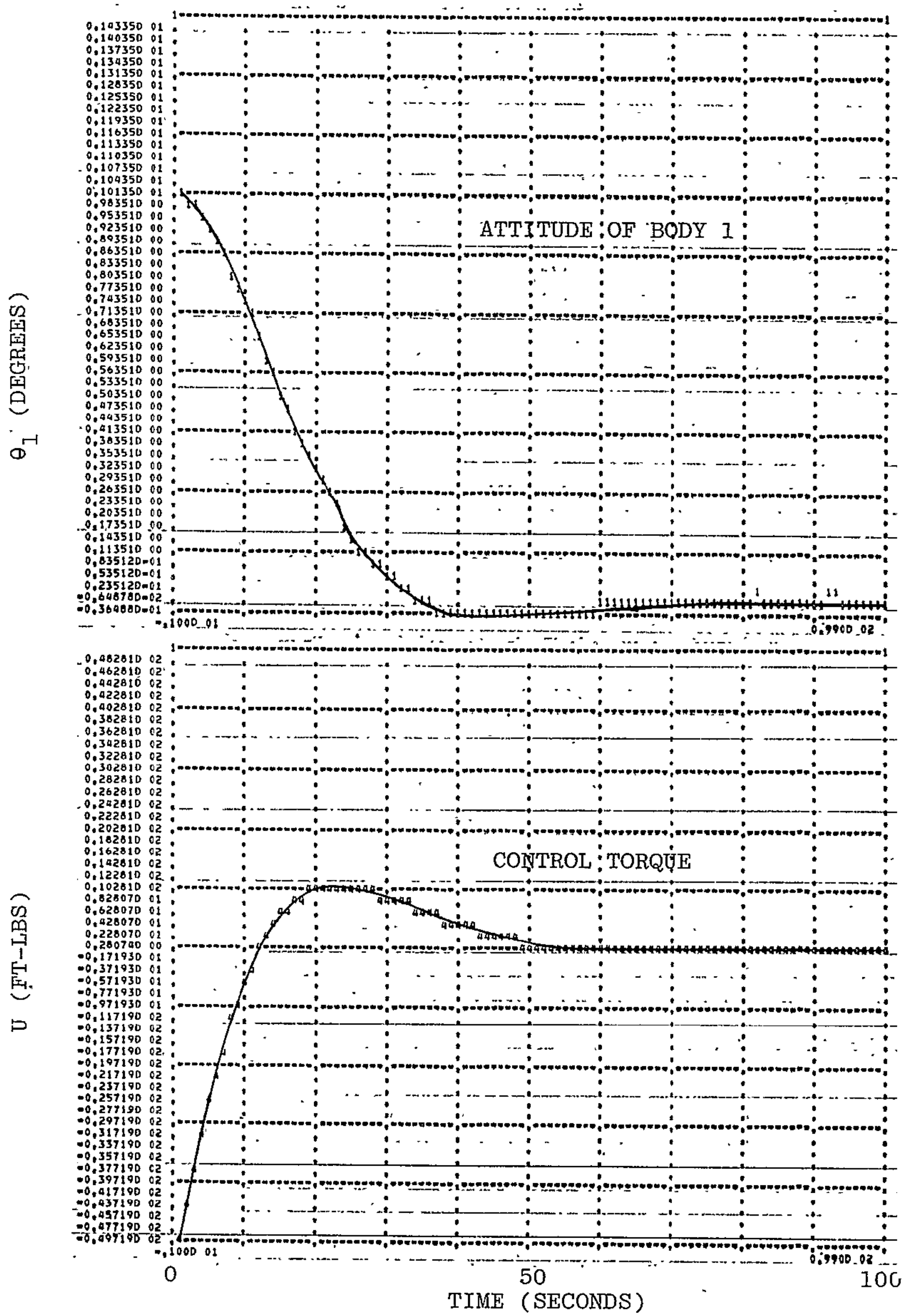

FIGURE 5-9 FULL STATE LQR FEEDBACK, CENTRAL BODY ATTITUDE AND CONTROL TORQUE INITIAL CONDITION: $\theta_1(0) = 1$ DEGREE

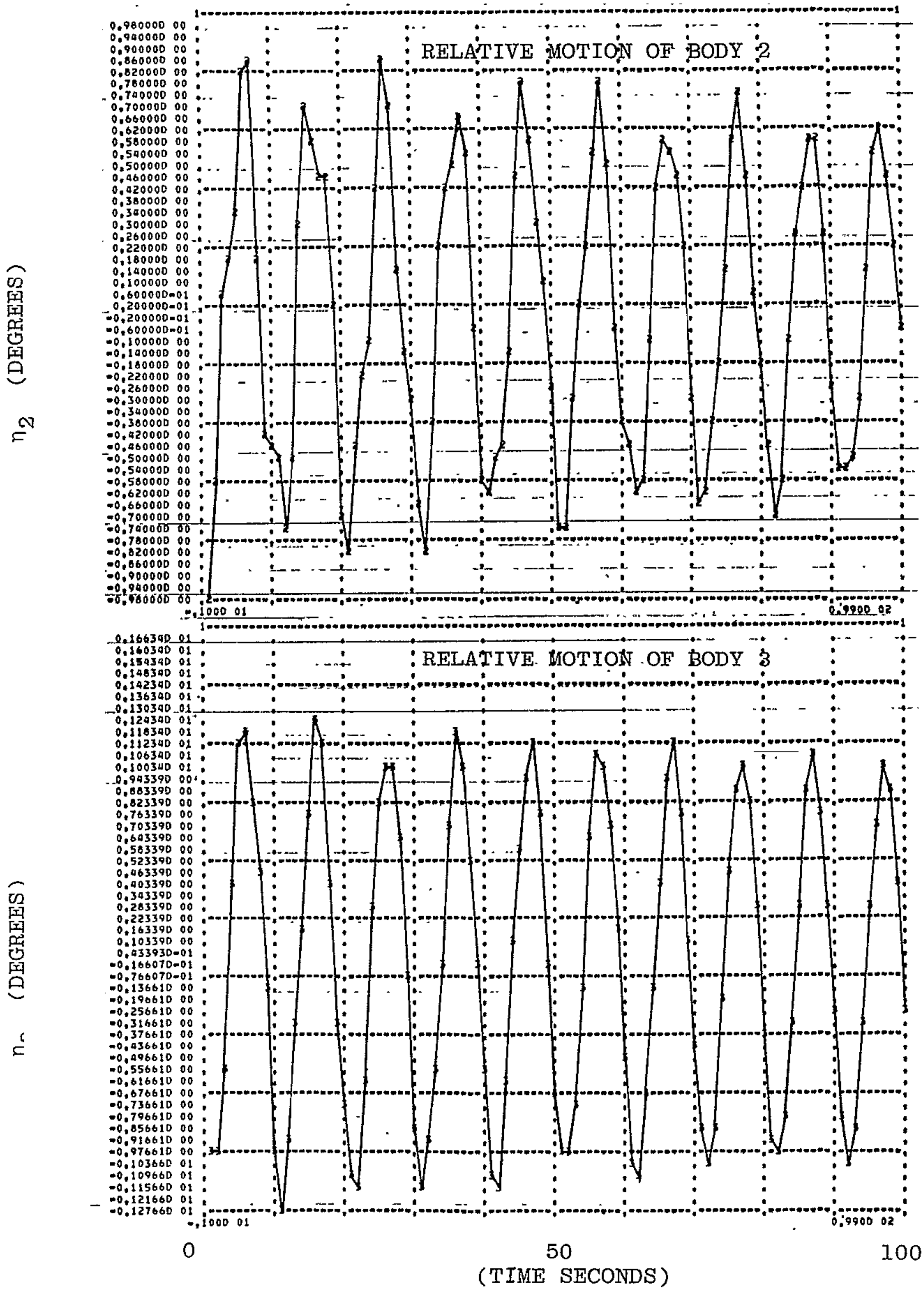

FIGURE 5-10 FULL STATE LQR FEEDBACK, RELATIVE MOTION OF INBOARD AND OUTBOARD APPENDAGES.

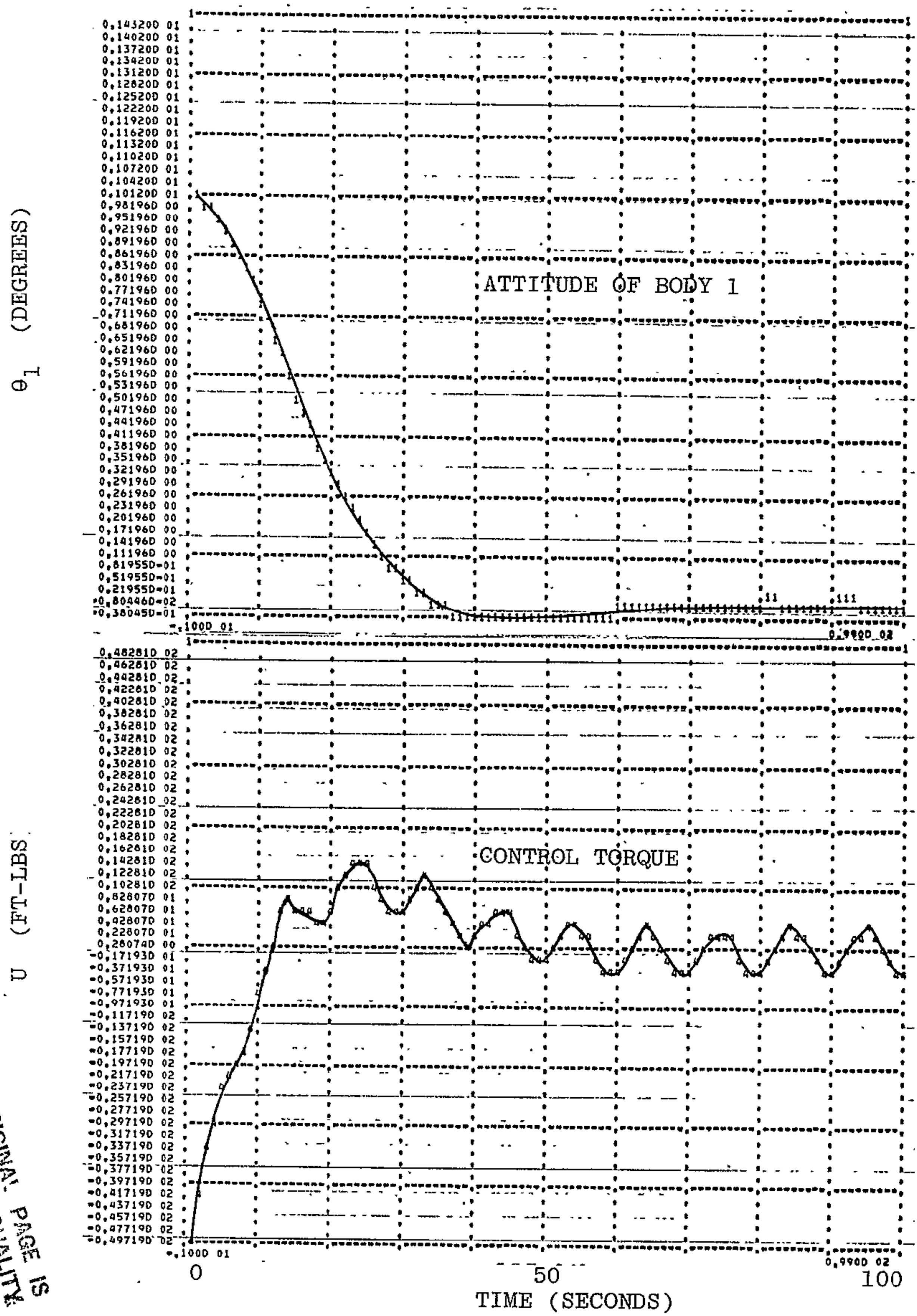

FIGURE 5-11 PARTIAL STATE "LQR" FEEDBACK
CENTRAL BODY ATTITUDE AND CONTROL TORQUE
INITIAL CONDITION: $\theta_1(0)$ = 1 DEGREE

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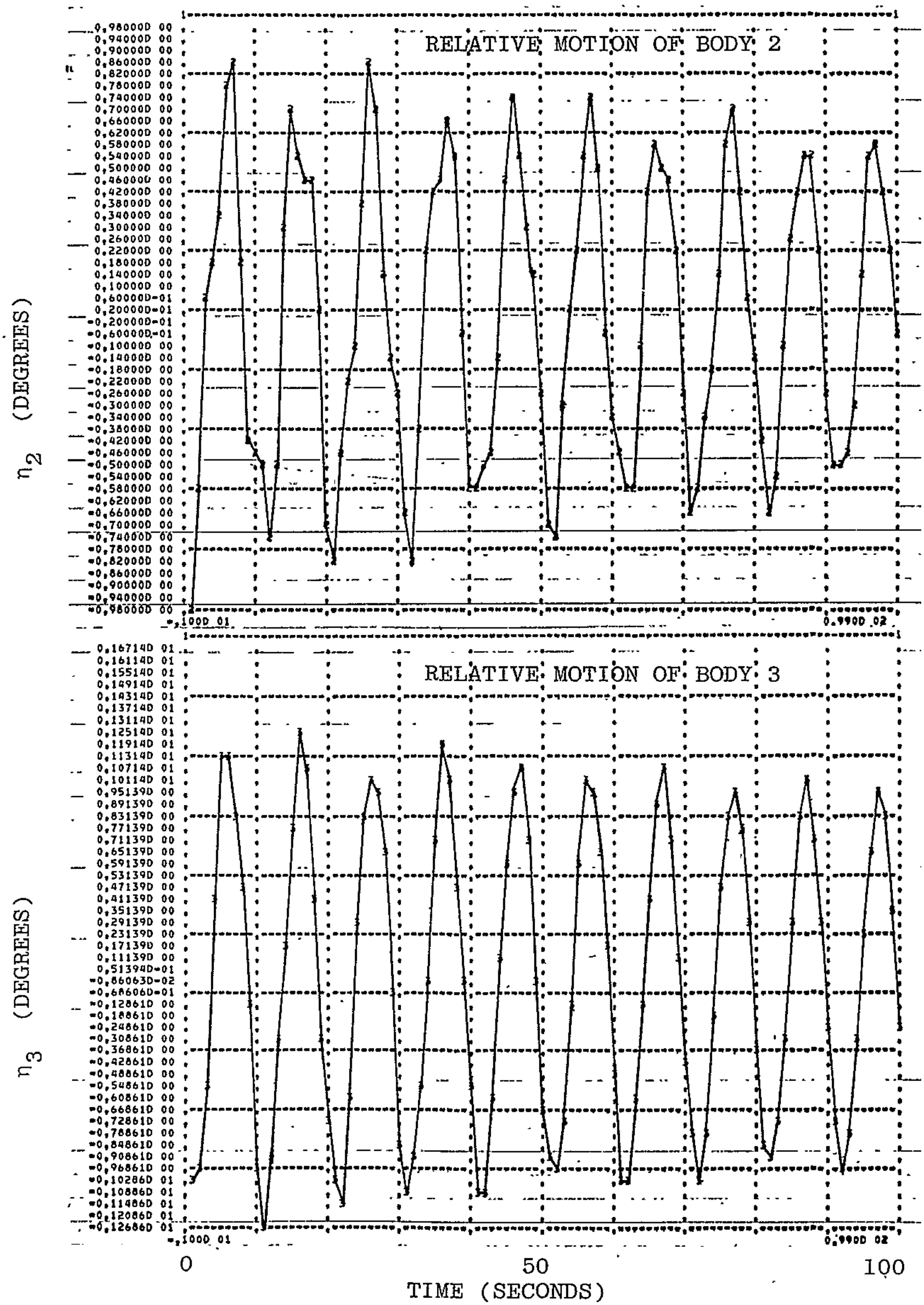

FIGURE 5-12 PARTIAL STATE "LQR" FEEDBACK RELATIVE MOTION OF INBOARD AND OUTBOARD APPENDAGES

5.4 DISCUSSION

In the previous sub-sections the LQR control technique described is a straight forward approach which is relatively easy to apply once a system is described in the state variable form. Some skill is involved in the selection of weighting factors (Q and R) for the performance index, otherwise the technique is relatively simple for linear, non-stochastic systems.

For the discrete mass and spring model defined here, only the full state variable feedback obtained completely satisfactory results. When solar wing appendage motion gains were reduced to zero, a lightly damped oscillation was obtained for the control torque u_1 -- although the response of the other variables appeared to be unchanged. This raises the question as to how the system would react for a multi-dimensional finite element representation for the solar wings. Feeding back hundreds of signals to a single actuator set seems to be impractical. Representing flexible modes of the solar wings by hybrid coordinates (Reference 5-8) would be a more reasonable approach, where truncation of high frequency or low mass solar wing modes may be accomplished in a selective manner.

The LQR control approach could be expanded in several different directions:

a. More elements or dimensions as discussed above by modeling appendages from finite element data, which may then be represented in hybrid coordinates (Reference 5-9).

b. Three axis vehicle models including cross coupling terms.

c. Including feedback sensor (and possibly actuator) noise sources and generating a feedback filter to generate a better estimate of x, usually referred to as the linear quadratic Gaussian (LQR) approach.

d. Attitude stabilize two or more locations on a large flexible spacecraft.

The application of LQR to d. can be demonstrated by a single axis representation of a long flexible vehicle as in Figure 5-13. If an intermediate mass and angle are represented as J_k and θ_k, respectively, locations 1, k and n on the vehicle can be stabilized by selecting the relative magnitudes of weighting factors in Q_1, Q_k and Q_n:

$$Q = \begin{bmatrix} Q_1 & 0 & & & & & & \\ 0 & 0 & & & & & \bigcirc & \\ & & \ddots & & & & & \\ & & & 0 & 0 & 0 & & \\ & & & 0 & Q_k & 0 & & \\ & & & 0 & 0 & 0 & & \\ & \bigcirc & & & & & \ddots & \\ & & & & & & 0 & 0 \\ & & & & & & 0 & Q_n \end{bmatrix} \qquad (5\text{-}24)$$

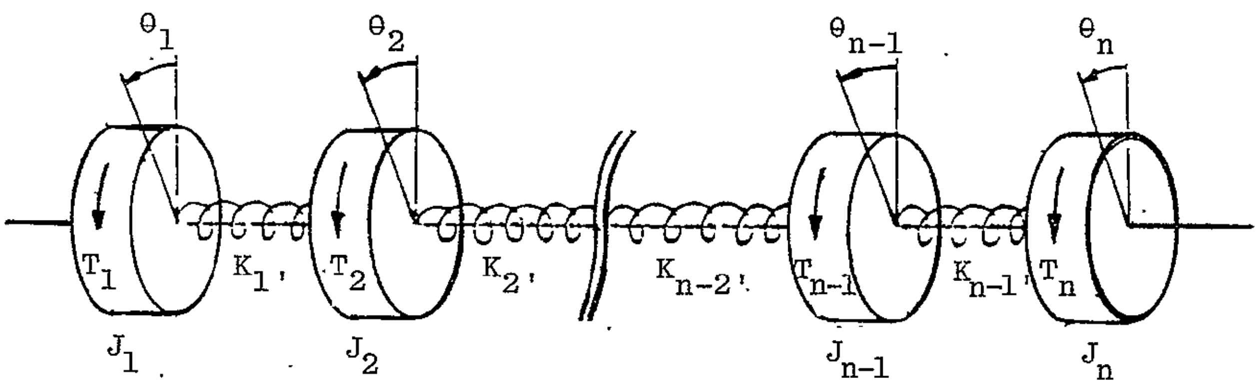

FIGURE 5-13 SINGLE AXIS N-DIMENSIONAL REPRESENTATION OF A LARGE FLEXIBLE VEHICLE

where $Q_i = \begin{bmatrix} q_{2i-1} & 0 \\ 0 & 0 \end{bmatrix}$ (5-25)

for i = 1, k, n.

The relative magnitudes of q_1, q_{2k-1} and q_{2n-1} may be selected according to the pointing performance requirements of θ_1 θ_k and θ_n. If a pointing stability or "jitter" requirement is specified, at say location m, $\dot{\theta}_m$ can be reduced by a high weighting of q_{2m} relative to q_{2m-1} and others.

5.5 REFERENCES

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SECTION 6

6.0 SIMULATION OF MNA CONTROL

Some findings regarding the mathematical analysis, control system design and simulation of a multivariable Nyquist array (MNA) control method are presented here, as they apply to control and stabilization of a large flexible vehicle.

The mathematical model for the space vehicle (SCB Configuration 1) was obtained using the discrete coordinate modeling method described in Section 2. The model was then simulated on a Systems Engineering Lab's SEL/32 digital computer for dynamic evaluation and control system synthesis.

The model was reconfigured into state space equation form for eigenvalue calculations and control system design. The full-order three-axis model was reduced to three five-body single-axis models to determine the effect of cross-axis coupling on the eigenvalues of the three-axis model. It was determined through eigenvalue assignment, that for control system design purposes, each axis could be independently controlled. Further analysis revealed that symmetry in the torsional axis could simplify the control design effort. This condition does not prevail, however, in either the normal or lateral axis.

Using the symmetric single axis model for the torsional mode, a control system design study was performed using the MNA method and the retallack pole placement procedure. The MNA design method reflects a need for single loop bridged-T compensation when a limited number of measurements are available to the control design. This is due primarily to the location of the lightly damped modes within the control system bandwidth. As the bridged-T compensator is a form of closed loop pole assignment, the remainder of the design study for the torsional axis was performed using the Pole Placement method.

Simulation results for the single axis reduced model and the full order three axis model were identical when the pole shifts where made parallel to the real axis. This type of pole shift is a form of "active damping" and was used successfully to achieve acceptable levels of closed loop system performances. The full scale test results confirm the negligible effects of cross-axis coupling from the torsional axis to the normal and lateral axis.

6.1 CONTROL DESIGN FOR THE Z-AXIS

It was decided at this point in the analysis to concentrate the control design effort on the Z axis of Configuration 1 for two reasons. First, the symmetry assumption detailed above simplified the mathematical model for design and analysis purposes. Since the design methods to be described later are new to the

flexible spacecraft application, a complete understanding of the advantages, disadvantages and limitations of the proposed methods is required before more involved models are used. Secondly, the control system design using the reduced Z axis model can be tested on the full five-body three-axis simulation and compared with the time response of the single axis reduced model simulation. A comparison of these time responses will provide the experience and knowledge necessary to pursue the more difficult X and Y axis designs for this and subsequent SCB configurations.

Using the five-body three-axis model, the transfer matrix $G_5(S)$ was computed using Danielevsky's method (reference 6-1). Several of the ninety transfer functions were plotted using Bode methods to reveal that all flexible modes are located within the control system bandwidth. Design problems related to this condition are detailed in References 6-2 and 6-3. This analysis was repeated for the symmetric Z-axis model with the rigid body dynamics removed. A typical magnitude Bode plot is indicated in Figure 6-1, which shows the modes as they appear in the system bandwidth. The complete set of transfer functions is indicated in Appendix B.

The eigenvalues for the reduced order model (ROM) are:

a. 0.0

b. 0.0

c,d. $-.00500564 \pm j1.00112$

e,f. $-.00160836 \pm j0.32045$

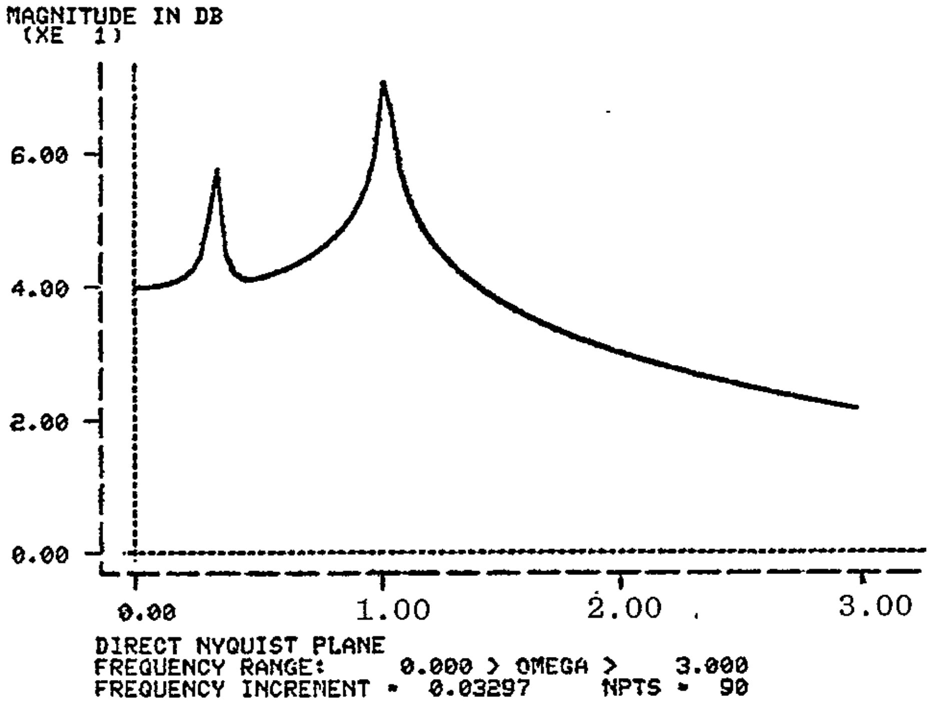


Figure 6-1. A Typical Bode Diagram for the Z Axis

This set corresponds to a denominator form of:

$$S^2\ (S^2 + 2\delta_1\omega_1 S+\omega_1{}^2)\ (S^2+2\delta_2\omega_2 S+\omega_2{}^2)$$

where the roots of each quadratic term are:

$$S_1, S_2 = -\ \delta\omega \pm j\sqrt{\omega^2(1-\delta^2)}$$

For $\delta<<1$, $S_1, S_2 \cong -\ \delta\omega\pm\ j\omega$ and

$$\omega = \mathrm{Im}(\lambda)$$

$$\delta = \mathrm{Re}(\lambda)/\mathrm{Im}(\lambda)$$

where λ is a complex eigenvalue. With the eigenvalue set above

$\omega_1 = 1.00112$ $\delta_1 = .00500004$

$\omega_2 = .32045$ $\delta_2 = .00501907$

The control system design for the ROM Z-axis model will proceed using the MNA method and the Retallack pole placement method. The MNA method will be considered using only ω_1 and ψ_{21} as the controlled outputs with τ_{1Z} and τ_{2Z} as the system inputs. The pole placement method will shift specific eigenvalues to prescribed locations using full state feedback.

6.2 MNA DESIGN FOR ROM Z-AXIS

Using the appropriate transfer functions from Appendix B, a direct Nyquist array (DNA) design was initiated over the frequency range $0 \leq \omega \leq 3.0$ using the technique described in Subsection 3.3. Recent results described in Reference 6-4 for finite frequency Nyquist array designs establish this range as acceptable for design and stability purposes.

For this DNA design the postcompensator matrix was prespecified as the identity matrix with the precompensator matrix selected in accordance with the algorithim in Reference 6-5. The closed loop diagram for this axis with

$$Q(S) = L\ G(S)\ K \qquad (6\text{-}1)$$

representing the forward loop transfer matrix is indicated in Figure 6-2,

where: G(S) = spacecraft vehicle transfer matrix
L, K = Post- and pre-compensator matrices
F(S) = Feedback transfer matrix.

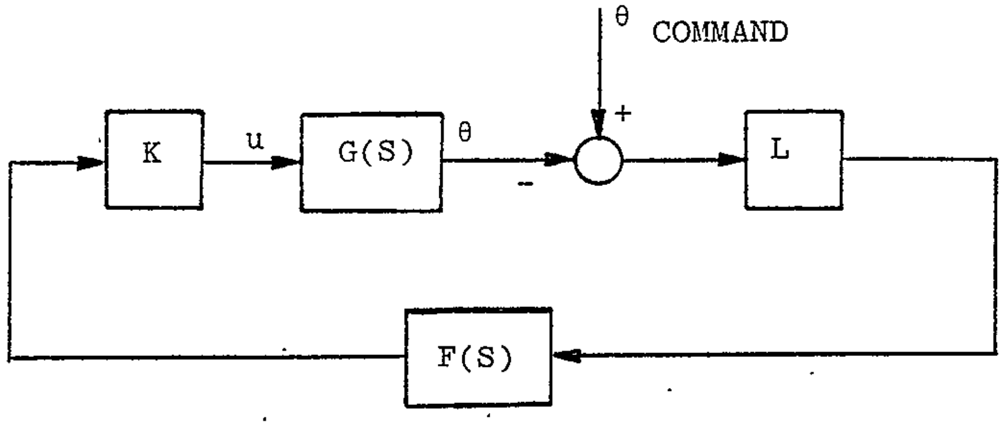


Figure 6-2. Closed Loop Spacecraft Control Diagram

In Reference 6-6, a procedure is described whereby Multivariable Bode diagrams can be obtained from MNA results using Reference 6-7. This procedure has been incorporated into an interactive design suite in Reference 6-8. Results for the ROM Z-axis are presented in Figures 6-3 and 6-4. The dominance levels obtained using equation (3-32) are very small, thus reflecting a decoupled condition as indicated by the virtual coincidence of the envelope curves in the Bode diagrams.

From Figure 6-3, the effect of solar wing interaction on the rigid body dynamics is seen to be negligible. Hence the control in loop 1 may proceed using a rigid body assumption. The dynamics indicated in Figure 6-4 reflect the lightly damped poles at ω = .32 and ω = 1.0 and also indicate the presence of a

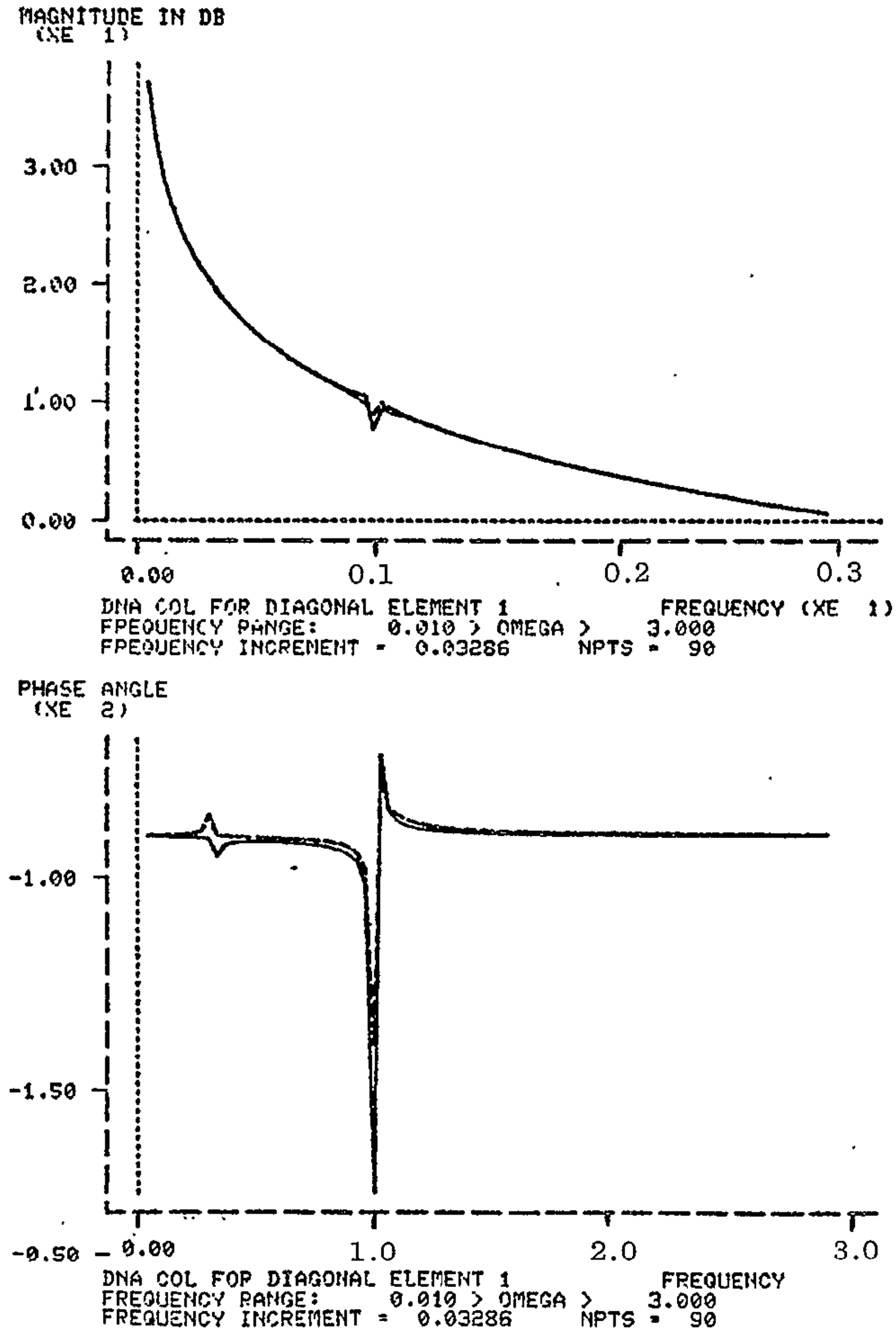


FIGURE 6-3 BODE DIAGRAM LOOP 1 FOR ROM Z-AXIS

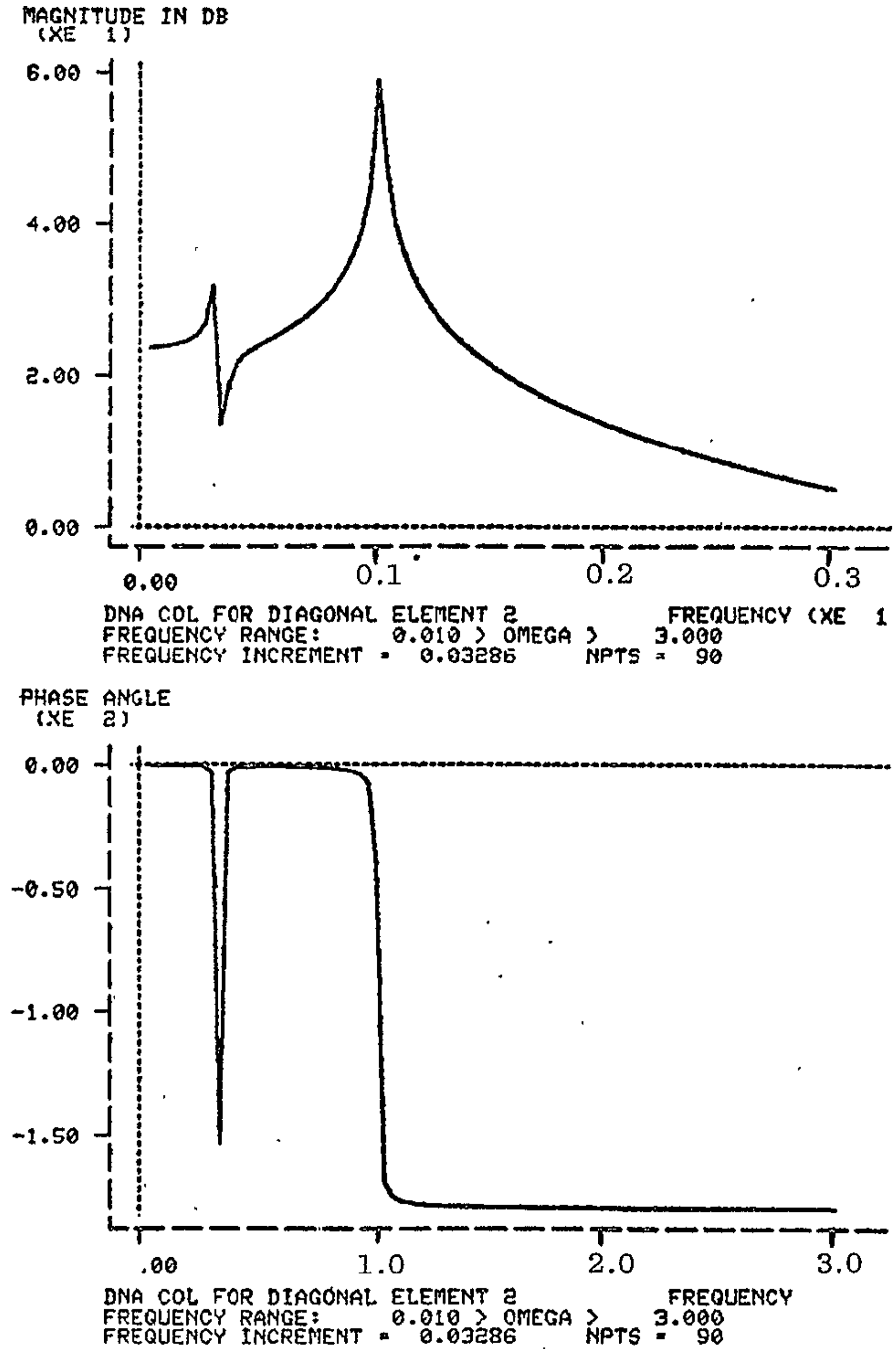


FIGURE 6-4 BODE DIAGRAM LOOP 2 FOR ROM Z-AXIS

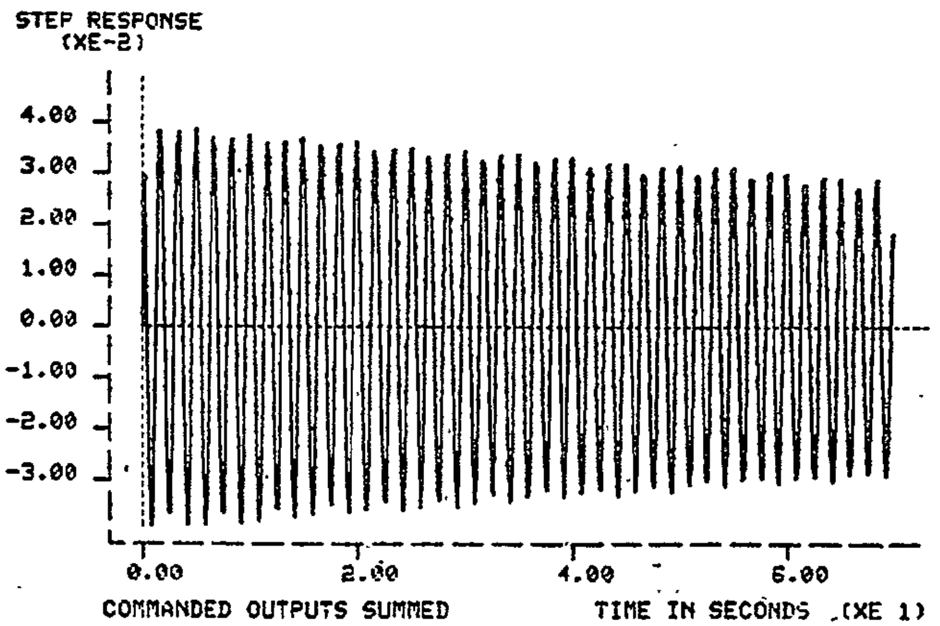
multivariable zero near $\omega = .32$. Since this anti-resonance is sharper than that of the pole at $\omega = .32$, the damping ratio for the zero is less than 0.005.

One possibility for the control of the mode at $\omega = .32$ is to decrease the damping ratio of the pole via a bridged-T compensator and shift the pole location to that of the multivariable zero. This approach would correspond to a pole-zero cancellation in the traditional single-input single-output case. Uncertainties in the dynamic model could, however, have a deleterious effect on the overall system behavior.

Alternatively the poles could be shifted outside the control bandwidth (active stiffening) and/or reduce the pole resonance peaks (active damping). Figure 6-5 indicates the time response of ψ_{21} in the closed loop system without dynamic compensation. In Figure 6-6, the Bode diagram for loop 2 is presented following a bridged-T compensator insertion to increase the damping ratio at $\omega = 1.0$ to $\delta = 0.1$.

$$F_{22}(S) = \frac{S^2 + .01\ S + 1.01}{S^2 + .2\ S + 1.01} \qquad (6\text{-}2)$$

Figure 6-7 indicates the closed loop time response for $\psi_{21}(t)$ using (6-2). Retaining the pole at $\omega = 1.0$ has the effect of reducing the impact of the resonance at $\omega = 0.32$ as it will appear principally as an envelope modulation in the time response.



FIGUR 6-5 CLOSED LOOP TIME RESPONSE FOR ψ_{21} WITH NO DYNAMIC COMPENSATION.

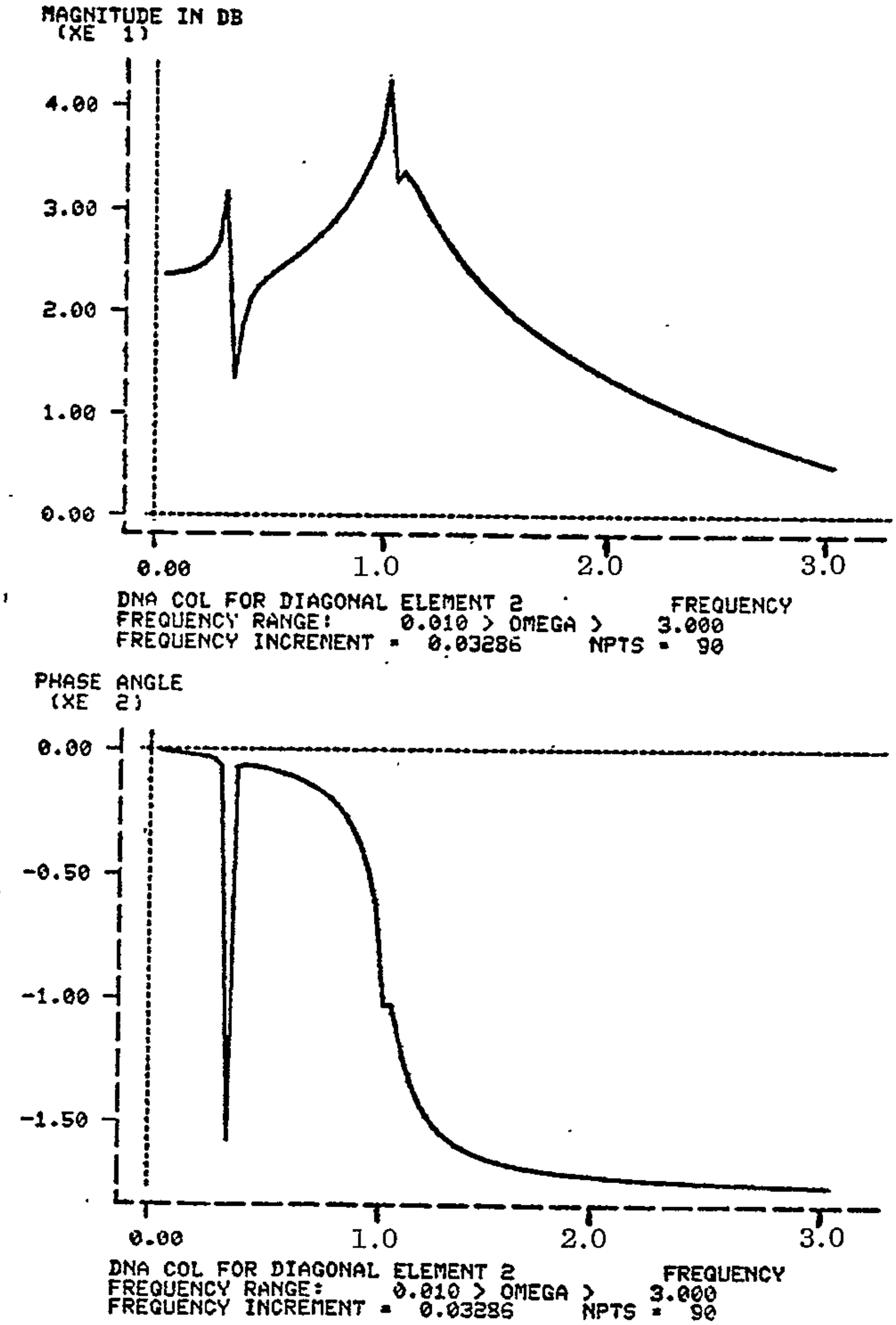


FIGURE 6-6 BODE DIAGRAM LOOP 2 WITH BRIDGED-T COMPENSATOR INSERTED

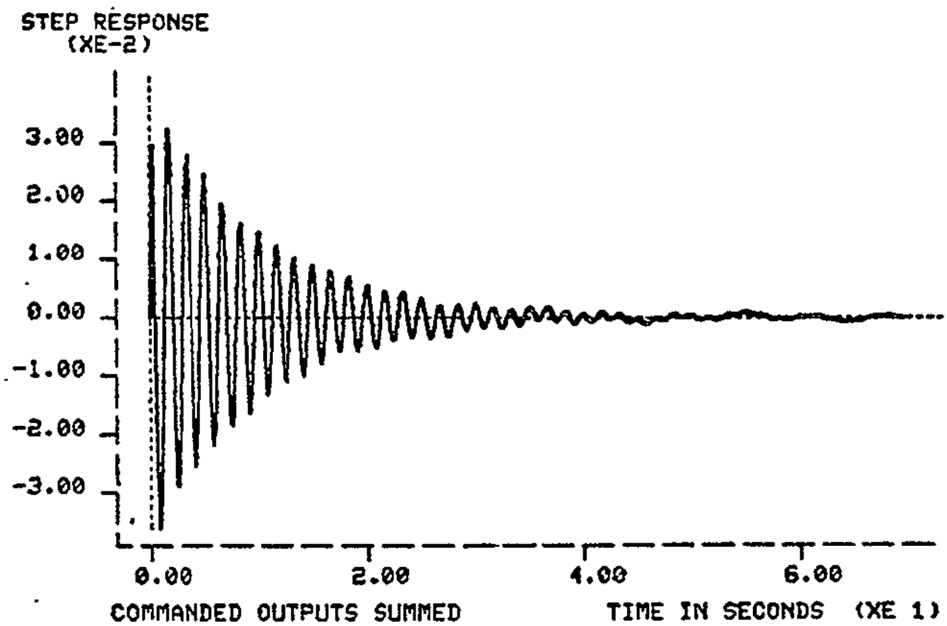


FIGURE 6-7 CLOSED LOOP ψ_{21} TIME RESPONSE FOR COMPENSATED SYSTEM

To examine the shift in frequency of the pole at $\omega = 1.0$, a bridged-T compensator was placed in loop 2 to increase the damping ratio to $\delta = 0.1$ and simultaneously shift the resonance to $\omega = 2.0$. This is equivalent to placing a complex zero pair at $\omega = 1.0$ and a complex pole pair at $\omega = 2.0$. The Bode diagram for this case is indicated in Figure 6-8 with the corresponding closed loop time response presented in Figure 6-9. Note that the zero placement removes the impact of the pole at $\omega = 1.0$ but increases the effect of the resonance at $\omega = .32$. This latter effect is due to the pole relocation at a higher frequency; i.e., system gain is effectively reduced by 50%. To recover the effect of Figure 6-7 the loop gain should be doubled. Alternatively, pole shifts in the resonance at $\omega = .32$ could be used. However, this would ultimately require a fourth order compensator for $f_{33}(S)$ in the closed loop control.

The above analysis and design synthesis for the ROM Z-axis model demonstrates the utility of the MNA method in the design of controls for flexible spacecraft. At this point, it was decided to postpone further design efforts using MNA procedures to examine the potential of the Retallack pole placement method.

6.3 RETALLACK POLE PLACEMENT FOR ROM Z-AXIS

The dyadic pole placement technique developed by Simon and Mitter (Reference 6-9) and further refined by Retallack and MacFarlane (Reference 6-10) utilizes the

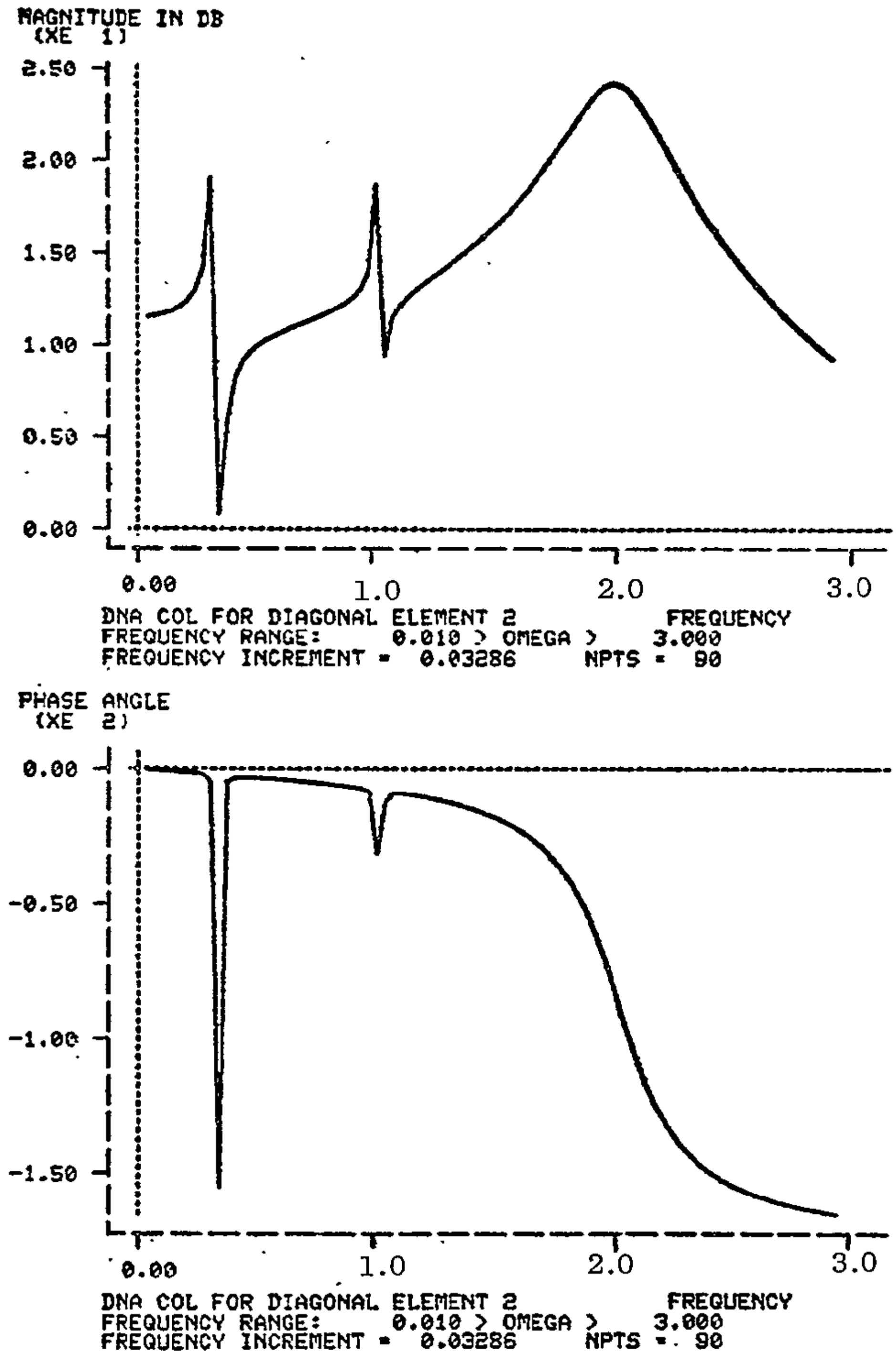
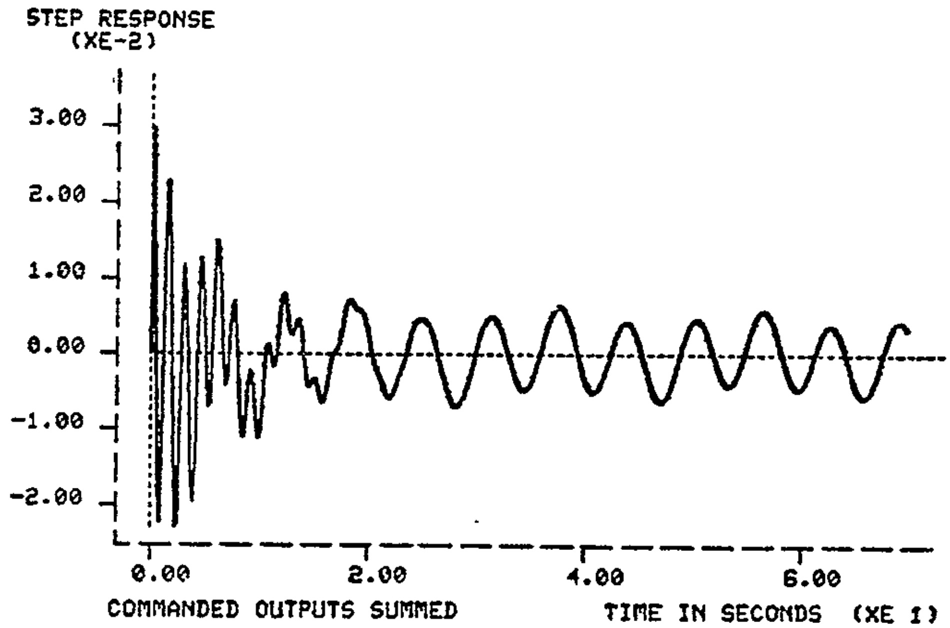


FIGURE 6-8 BODE PLOT FOR LOOP 2 WITH SIMULTANEOUS FREQUENCY AND DAMPING RATIO SHIFT OF POLE AT ω=1.0.



FUGYRE 6-9 CLOSED LOOP TIME RESPONSE FOR ψ_{21}

model structure of a linear system to give the designer direct control over the movement of given system modes to desired closed loop locations. Unlike other methods, the Retallack algorithm is a state feedback procedure which allows for the direct assignment of specific open loop poles to specific closed loop locations. This method is particularly attractive from a design viewpoint whenever the open loop poles can be directly associated with specific parts of the physical system. In this way only those poles directly associated with the subsystem will be shifted.

Let λ_j ($j = 1, \cdots, n$) represent the open loop poles of the system and let ρ_i ($i = 1, \cdots, n$) be the desired closed loop set. Several algorithms are presently available to shift the eigenvalue set $\{\lambda_j\}$ to the desired set $\{\rho_i\}$. However, there is no guarantee that any particular eigenvalue λ_j will be moved to a specific location ρ_i. Without this eigenvalue location assignment flexibility, the resulting control in light of sensor and/or actuator failures could result in very unsatisfactory performance.

Given the dynamic system

$$\dot{x} = Ax + Bu \tag{6-3}$$

and the control law of the form

$$u(t) = r - Kx \tag{6-4}$$

where r is the set point control, the eigenvalues $\{\rho_i\}$ of the resulting closed loop system

$$\dot{x} = (A-BK)\, x + Br \tag{6-5}$$

are related to the open loop eigenvalue (λ_j) by the Hsu-Chen equation (Reference 6-11)

$$\left| I_n - (SI_n - A)^{-1}\, BK \right| = \frac{\prod_{i=1}^{n} (S-\rho_i)}{\prod_{j=1}^{n} (S-\lambda_j)} \tag{6-6}$$

The Jordan Cononical form for A is given by:

$$\Lambda = U^{-1}\, AU \tag{6-7}$$

where U is the modal matrix for A. Let $(\lambda_1, \lambda_2, \cdots, \lambda_p)$ $p \leq n$ be the open loop poles to be shifted and define the modal controller K using the unity rank dyadic product as

$$K = f\, d^T\, V \tag{6-8}$$

where f is an m vector, d is a p vector and V contains the p rows of U^{-1} corresponding to $(\lambda_1, \cdots, \lambda_p)$. Using (6-8), Retallack reduces (6-6) to

$$1+d^T\, (SI_p - \Lambda)^{-1}\, \beta = \frac{\prod_{i=1}^{p} (S-\rho_i)}{\prod_{j=1}^{p} (S-\lambda_j)} \tag{6-9}$$

where

$$\beta = VBF \tag{6-10}$$

The remaining open loop poles ($\lambda_{p+1}, \cdots, \lambda_p$) remain unchanged under dyadic feedback.

To overcome some of the numerical difficulties associated with the computation of the modal controller when clustered poles appear near the imaginary axis (Reference 6-12), the system in (6-3) is transformed to the Luenberger canonical Form (Reference 6-13),

$$\dot{w} = \hat{A}w + \hat{B}u \tag{6-11}$$

where $w = U^{-1} x$ and

$$\hat{A} = U^{-1}AU \tag{6-12}$$

$$\hat{B} = U^{-1}B \tag{6-13}$$

An efficient algorithm to realize this transformation is presented in Reference 6-14.

Since the eigenvalues of ($\hat{A}-\hat{B}\hat{K}$) are identical to those of A-BK, the pole placement process can be accomplished in the closed-loop system of (6-11) rather than in the closed-loop system in (6-3). Once the gain matrix K has been determined for the canonical system, the desired modal controller K for the original system (6-3) is given by

$$K = \hat{K}U^{-1} \tag{6-14}$$

For the ROM Z-axis model provided in Appendix B the system equations can be partitioned into two distinct sets: one for the rigid body dynamics and one

for the flexible appendage. The open loop eigenvalue sets are, respectively,

Set 1: 0.0, 0.0

Set 2: $-.00500564 \pm j\ 1.00112$
$-.00160836 \pm j\ 0.320495$

Here ψ_1 was added to the state vector to produce the second pole at the origin. The state variables are then ω_1, ω_{21}, ω_{42}, ψ_{21}, ψ_{42}, and ψ_1 with controls τ_{1Z} and τ_{2Z}. For the five-body single-axis control implementation τ_{3Z} is set equal to τ_{2Z} since symmetry was used to generate the Z-axis ROM.

The rigid body eigenvalues were shifted to the following positions

a1. -.1, -.1
b1. -.2, -.2
c1. -.3, -.3
d1. -.7, -.7

while the modes corresponding to the solar wing were shifted to

a2. $-.1 \pm j\ 1.00112$
$-.1 \pm j\ 0.320495$

b2. $-.2 \pm j\ 1.00112$
$-.2 \pm j\ 0.320495$

c2. $-.7 \pm j\ 1.00112$
$-.7 \pm j\ 0.320495$

The resulting control laws were implemented in a time domain simulation of the Z-axis reduced order model with $\psi_1\ (t_o) = .02$ radians. Since all velocities, $\dot{\psi}_{21}\ (t_o)$ and $\dot{\psi}_{42}\ (t_o)$ are zero, this condition corresponds to an equilibrium point with all masses displayed .02 radians from the desired equilibrium point. In each case, the control restored the vehicle to the desired location in the manner indicated by the closed loop eigenvalue characteristics. Table 6-1 compares several of the important characteristics of the simulator responses.

The main purpose of this study was to demonstrate that the Retallack Pole Placement method can be effectively used in the control of flexible space vehicles of the SCB configuration. Several observations resulting from this effort are indicated below:

1. As the eigenvalues of the rigid body are moved further into the left half plane with fixed solar wing eigenvalues, the peak to peak excursions of ψ_{21} and ψ_{42} increase appreciably with little variation in the time to steady state.

2. For fixed rigid body eigenvalues and variable solar wing eigenvalues, the time to steady state decreases in proportion to the rate of increase in the damping ratio with small variations in the peak to peak excursions of ψ_{21} and ψ_{42}.

TABLE 6-1 CLOSED LOOP RESPONSE

$\psi_1(0) = 0.02$

EIGENVALUE SET	FIGURE NUMBERS	MAX $\lvert\tau_{1Z}\rvert$	MAX $\lvert\tau_{2Z}\rvert$	TIME TO STEADY STATE AND PEAK VALUE					
				ψ_1		ψ_{21}		ψ_{42}	
				SECONDS	RADIANS	SECONDS	RADIANS	SECONDS	RADIANS
a_1, a_2	---	53.7	0.320	50.0	0.02	25.0	0.00050	25.0	0.0016
b_1, a_2	---	214.82	1.112	29.0	0.02	30.0	0.0021	24.0	0.0047
c_1, a_2	---	483.35	2.025	20.0	0.02	36.0	0.0041	30.0	0.0079
a_1, b_2	---	53.7	0.461	50.0	0.02	21.0	0.00085	25.0	0.0017
b_1, b_2	---	214.82	1.4518	29.0	0.02	25.0	0.0026	22.0	0.0051
c_1, b_2	6-10 to 6-14	483.4	2.717	17.0	0.02	25.0	0.0051	17.0	0.0088
d_1, b_2	6-15 to 6-19	2631.6	9.071	8.0	0.02	18.5	0.0171	18.5	0.0218
d_1, c_2	6-20 to 6-24	2631.6	30.637	8.0	0.02	13.0	0.0207	12.0	0.0303

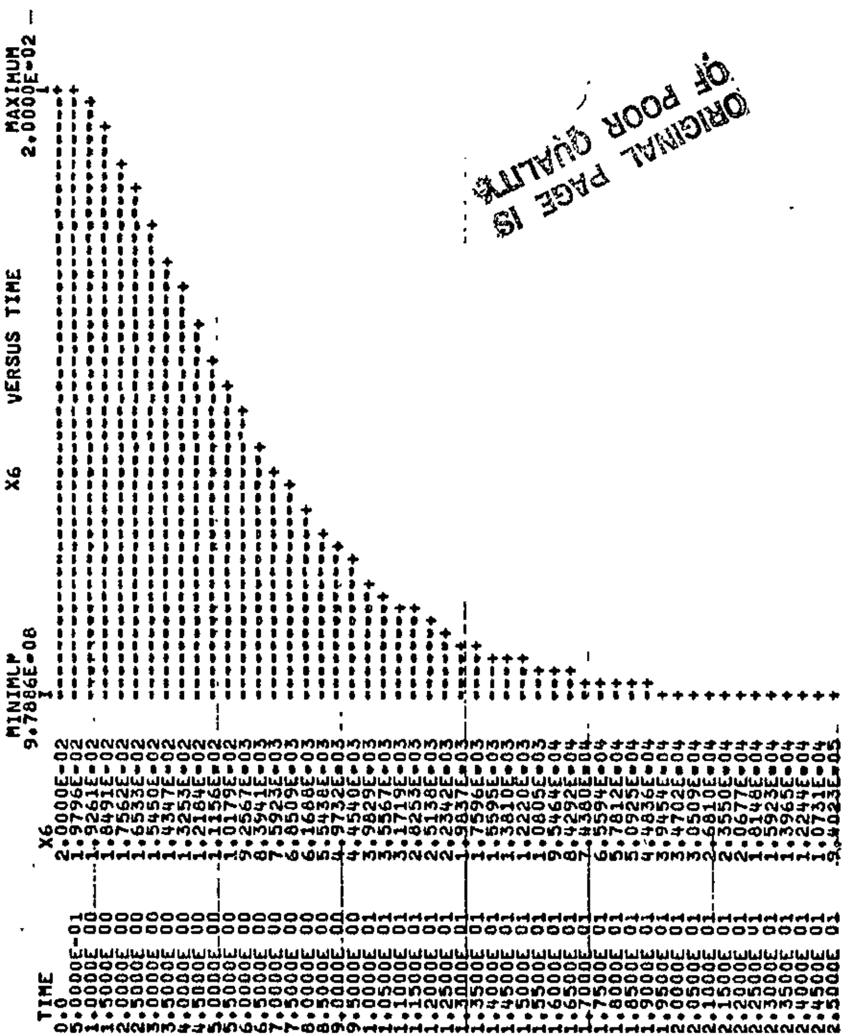


FIGURE 6-10 ANGULAR POSITION
BODY 1

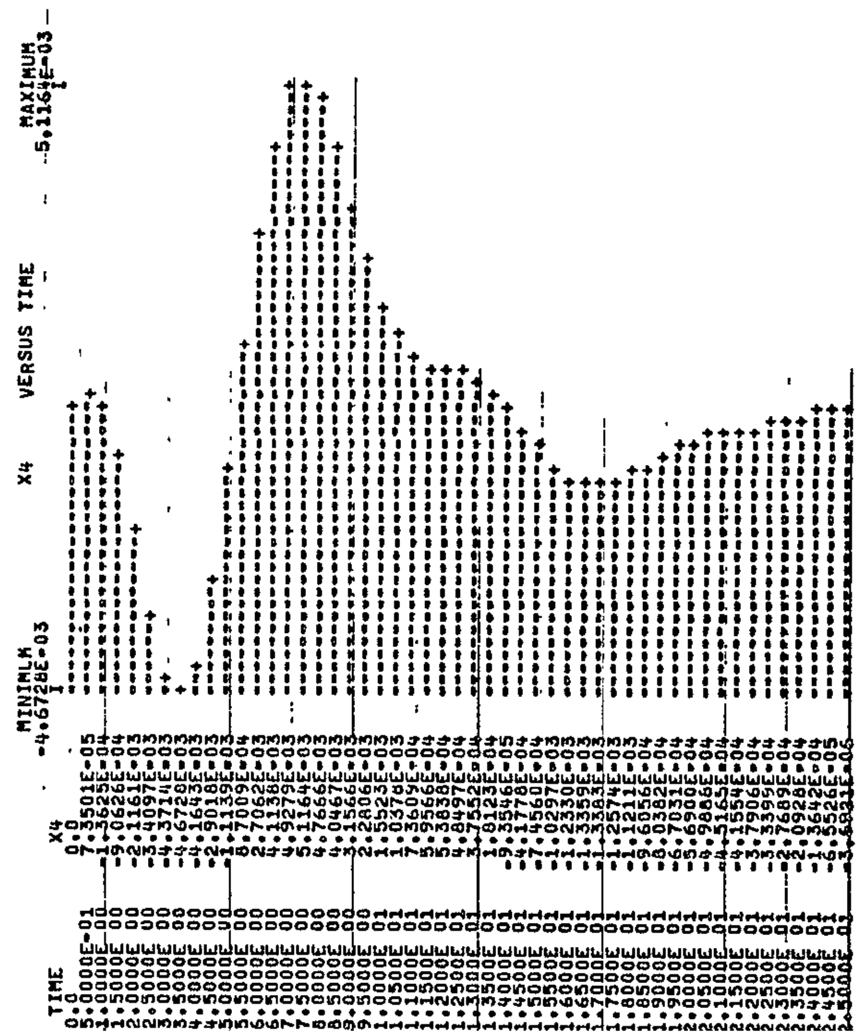


FIGURE 6-11 RELATIVE ANGULAR POSITION
BODY 2

MINIMUM -4.7957E-03   X5 VERSUS TIME   MAXIMUM 8.8173E-03

TIME	X5
0.0	0.0
5.0000E-01	1.2993E-04
1.0000E 00	8.6814E-04
1.5000E 00	2.3718E-03
2.0000E 00	4.3998E-03
2.5000E 00	6.4783E-03
3.0000E 00	8.0868E-03
3.5000E 00	8.8173E-03
4.0000E 00	8.4753E-03
4.5000E 00	7.1092E-03
5.0000E 00	4.9745E-03
5.5000E 00	2.4534E-03
6.0000E 00	-4.3427E-05
6.5000E 00	-2.1676E-03
7.0000E 00	-3.6949E-03
7.5000E 00	-4.5503E-03
8.0000E 00	-4.7957E-03
8.5000E 00	-4.5904E-03
9.0000E 00	-4.1375E-03
9.5000E 00	-3.6310E-03
1.0000E 01	-3.2154E-03
1.0500E 01	-2.9644E-03
1.1000E 01	-2.8808E-03
1.1500E 01	-2.9117E-03
1.2000E 01	-2.9749E-03
1.2500E 01	-2.9864E-03
1.3000E 01	-2.8834E-03
1.3500E 01	-2.6378E-03
1.4000E 01	-2.2588E-03
1.4500E 01	-1.7862E-03
1.5000E 01	-1.2777E-03
1.5500E 01	-7.9307E-04
1.6000E 01	-3.8173E-04
1.6500E 01	-7.3370E-05
1.7000E 01	1.2475E-04
1.7500E 01	2.2530E-04
1.8000E 01	2.5451E-04
1.8500E 01	2.4390E-04
1.9000E 01	2.2253E-04
1.9500E 01	2.1126E-04
2.0000E 01	2.2002E-04
2.0500E 01	2.4814E-04
2.1000E 01	2.8709E-04
2.1500E 01	3.2449E-04
2.2000E 01	3.4828E-04
2.2500E 01	3.5002E-04
2.3000E 01	3.2665E-04
2.3500E 01	2.8073E-04
2.4000E 01	2.1919E-04
2.4500E 01	1.5129E-04
2.5000E 01	8.6321E-05

FIGURE 6-12 RELATIVE ANGULAR POSITION BODY 4

MINIMUM -4.8335E 02   U1 VERSUS TIME   MAXIMUM 6.5330E-01

TIME	U1
0.0	-4.8335E 02
5.0000E-01	-3.5362E 02
1.0000E 00	-2.5065E 02
1.5000E 00	-1.6951E 02
2.0000E 00	-1.0611E 02
2.5000E 00	-5.7080E 01
3.0000E 00	-1.9652E 01
3.5000E 00	8.4568E 00
4.0000E 00	2.9116E 01
4.5000E 00	4.3856E 01
5.0000E 00	5.3925E 01
5.5000E 00	6.0338E 01
6.0000E 00	6.3918E 01
6.5000E 00	6.5330E 01
7.0000E 00	6.5108E 01
7.5000E 00	6.3681E 01
8.0000E 00	6.1388E 01
8.5000E 00	5.8498E 01
9.0000E 00	5.5223E 01
9.5000E 00	5.1724E 01
1.0000E 01	4.8129E 01
1.0500E 01	4.4532E 01
1.1000E 01	4.1003E 01
1.1500E 01	3.7593E 01
1.2000E 01	3.4338E 01
1.2500E 01	3.1260E 01
1.3000E 01	2.8373E 01
1.3500E 01	2.5684E 01
1.4000E 01	2.3194E 01
1.4500E 01	2.0899E 01
1.5000E 01	1.8793E 01
1.5500E 01	1.6869E 01
1.6000E 01	1.5116E 01
1.6500E 01	1.3524E 01
1.7000E 01	1.2082E 01
1.7500E 01	1.0780E 01
1.8000E 01	9.6055E 00
1.8500E 01	8.5494E 00
1.9000E 01	7.6011E 00
1.9500E 01	6.7512E 00
2.0000E 01	5.9905E 00
2.0500E 01	5.3108E 00
2.1000E 01	4.7042E 00
2.1500E 01	4.1635E 00
2.2000E 01	3.6822E 00
2.2500E 01	3.2542E 00
2.3000E 01	2.8740E 00
2.3500E 01	2.5365E 00
2.4000E 01	2.2373E 00
2.4500E 01	1.9723E 00
2.5000E 01	1.7377E 00

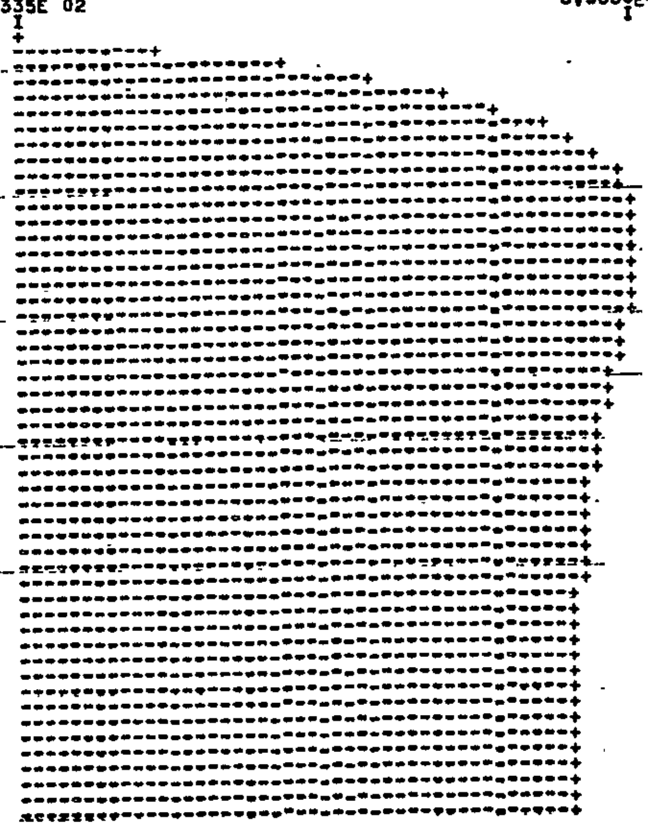


FIGURE 6-13 CONTROL TORQUE BODY 1

U2 VERSUS TIME

MINIMUM -2.6969E 00

MAXIMUM 2.7171E 00

TIME	U2
0.0	0.0
5.0000E-01	-1.9498E 00
1.0000E 00	-2.6838E 00
1.5000E 00	-2.6969E 00
2.0000E 00	-2.3757E 00
2.5000E 00	-1.9744E 00
3.0000E 00	-1.6190E 00
3.5000E 00	-1.3325E 00
4.0000E 00	-1.0743E 00
4.5000E 00	-7.8066E-01
5.0000E 00	-3.9955E-01
5.5000E 00	8.8312E-02
6.0000E 00	6.6272E-01
6.5000E 00	1.2704E 00
7.0000E 00	1.8405E 00
7.5000E 00	2.3027E 00
8.0000E 00	2.6035E 00
8.5000E 00	2.7171E 00
9.0000E 00	2.6479E 00
9.5000E 00	2.4268E 00
1.0000E 01	2.1019E 00
1.0500E 01	1.7270E 00
1.1000E 01	1.3510E 00
1.1500E 01	1.0100E 00
1.2000E 01	7.2370E-01
1.2500E 01	4.9568E-01
1.3000E 01	3.1734E-01
1.3500E 01	1.7339E-01
1.4000E 01	4.7594E-02
1.4500E 01	-7.2564E-02
1.5000E 01	-1.9324E-01
1.5500E 01	-3.1376E-01
1.6000E 01	-4.2804E-01
1.6500E 01	-5.2719E-01
1.7000E 01	-6.0235E-01
1.7500E 01	-6.4724E-01
1.8000E 01	-6.5959E-01
1.8500E 01	-6.4155E-01
1.9000E 01	-5.9893E-01
1.9500E 01	-5.3979E-01
2.0000E 01	-4.7272E-01
2.0500E 01	-4.0528E-01
2.1000E 01	-3.4291E-01
2.1500E 01	-2.8850E-01
2.2000E 01	-2.4251E-01
2.2500E 01	-2.0364E-01
2.3000E 01	-1.6967E-01
2.3500E 01	-1.3835E-01
2.4000E 01	-1.0804E-01
2.4500E 01	-7.8058E-02
2.5000E 01	-4.8746E-02

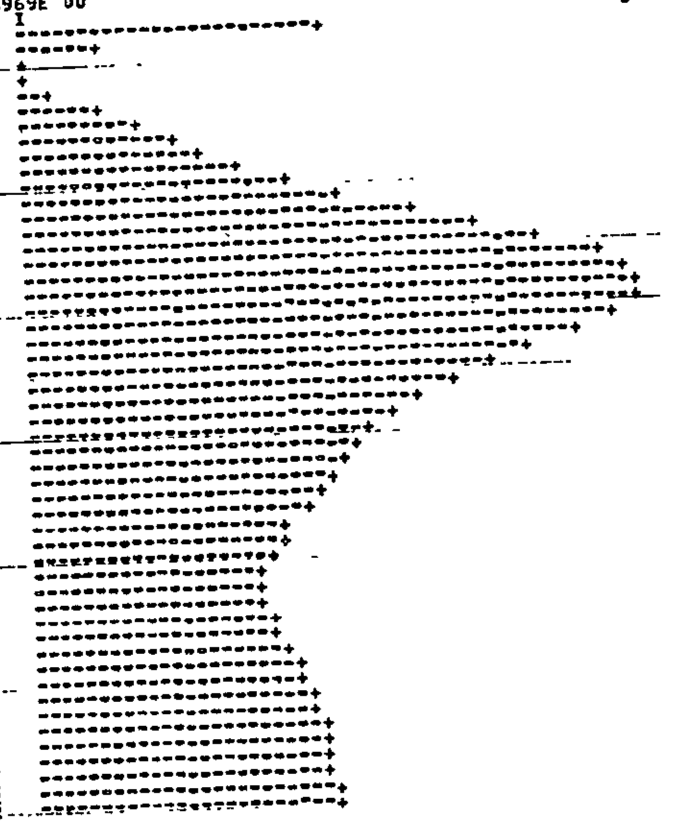


FIGURE 6-14 CONTROL TORQUE BODY 2

MINIMUM 4.5403E-16 — X6 VERSUS TIME — MAXIMUM 2.0000E-02

TIME	X6
0.0	2.0000E-02
5.0000E-01	1.9027E-02
1.0000E 00	1.6884E-02
1.5000E 00	1.4347E-02
2.0000E 00	1.1837E-02
2.5000E 00	9.5575E-03
3.0000E 00	7.5922E-03
3.5000E 00	5.9542E-03
4.0000E 00	4.6215E-03
4.5000E 00	3.5567E-03
5.0000E 00	2.7178E-03
5.5000E 00	2.0641E-03
6.0000E 00	1.5595E-03
6.5000E 00	1.1730E-03
7.0000E 00	8.7870E-04
7.5000E 00	6.5594E-04
8.0000E 00	4.8812E-04
8.5000E 00	3.6222E-04
9.0000E 00	2.6810E-04
9.5000E 00	1.9799E-04
1.0000E 01	1.4590E-04
1.0500E 01	1.0732E-04
1.1000E 01	7.8794E-05
1.1500E 01	5.7759E-05
1.2000E 01	4.2276E-05
1.2500E 01	3.0901E-05
1.3000E 01	2.2557E-05
1.3500E 01	1.6447E-05
1.4000E 01	1.1978E-05
1.4500E 01	8.7143E-06
1.5000E 01	6.3337E-06
1.5500E 01	4.5991E-06
1.6000E 01	3.3367E-06
1.6500E 01	2.4188E-06
1.7000E 01	1.7520E-06
1.7500E 01	1.2681E-06
1.8000E 01	9.1725E-07
1.8500E 01	6.6301E-07
1.9000E 01	4.7894E-07
1.9500E 01	3.4576E-07
2.0000E 01	2.4948E-07
2.0500E 01	1.7991E-07
2.1000E 01	1.2967E-07
2.1500E 01	9.3413E-08
2.2000E 01	6.7263E-08
2.2500E 01	4.8411E-08
2.3000E 01	3.4827E-08
2.3500E 01	2.5045E-08
2.4000E 01	1.8003E-08
2.4500E 01	1.2936E-08
2.5000E 01	9.2916E-09

FIGURE 6-15 ANGULAR POSITION BODY 1

MINIMUM -1.2467E-02 — X4 VERSUS TIME — MAXIMUM 1.7140E-02

TIME	X4
0.0	0.0
5.0000E-01	3.3140E-04
1.0000E 00	-7.8993E-04
1.5000E 00	-4.0811E-03
2.0000E 00	-8.2966E-03
2.5000E 00	-1.1590E-02
3.0000E 00	-1.2467E-02
3.5000E 00	-1.0293E-02
4.0000E 00	-5.3975E-03
4.5000E 00	1.1339E-03
5.0000E 00	7.8445E-03
5.5000E 00	1.3327E-02
6.0000E 00	1.6568E-02
6.5000E 00	1.7140E-02
7.0000E 00	1.5228E-02
7.5000E 00	1.1499E-02
8.0000E 00	6.8872E-03
8.5000E 00	2.3504E-03
9.0000E 00	-1.3416E-03
9.5000E 00	-3.7372E-03
1.0000E 01	-4.7419E-03
1.0500E 01	-4.5697E-03
1.1000E 01	-3.6348E-03
1.1500E 01	-2.4194E-03
1.2000E 01	-1.3506E-03
1.2500E 01	-7.1377E-04
1.3000E 01	-6.1535E-04
1.3500E 01	-9.9402E-04
1.4000E 01	-1.6689E-03
1.4500E 01	-2.4065E-03
1.5000E 01	-2.9679E-03
1.5500E 01	-3.2601E-03
1.6000E 01	-3.1623E-03
1.6500E 01	-2.7262E-03
1.7000E 01	-2.0546E-03
1.7500E 01	-1.2665E-03
1.8000E 01	-5.6049E-04
1.8500E 01	1.5835E-05
1.9000E 01	3.8417E-04
1.9500E 01	5.3930E-04
2.0000E 01	5.2033E-04
2.0500E 01	3.9352E-04
2.1000E 01	2.3217E-04
2.1500E 01	9.8740E-05
2.2000E 01	3.2779E-05
2.2500E 01	4.6472E-05
2.3000E 01	1.2733E-04
2.3500E 01	2.4613E-04
2.4000E 01	3.6728E-04
2.4500E 01	4.5873E-04
2.5000E 01	6.9930E-04

FIGURE 6-16 RELATIVE ANGULAR POSITION BODY 2

MINIMLM -2.0169E-02 X5 VERSUS TIME MAXIMUM 2.1782E-02

TIME	X5
0.0	0.0
5.0000E-01	6.4059E-04
1.0000E 00	3.8735E-03
1.5000E 00	9.5404E-03
2.0000E 00	1.5612E-02
2.5000E 00	2.0460E-02
3.0000E 00	2.1782E-02
3.5000E 00	1.9101E-02
4.0000E 00	1.2854E-02
4.5000E 00	4.3474E-03
5.0000E 00	-4.6729E-03
5.5000E 00	-1.2502E-02
6.0000E 00	-1.7870E-02
6.5000E 00	-2.0169E-02
7.0000E 00	-1.9495E-02
7.5000E 00	-1.6520E-02
8.0000E 00	-1.2247E-02
8.5000E 00	-7.7429E-03
9.0000E 00	-3.8955E-03
9.5000E 00	-1.2564E-03
1.0000E 01	1.2465E-05
1.0500E 01	9.4952E-05
1.1000E 01	-5.9257E-04
1.1500E 01	-1.5459E-03
1.2000E 01	-2.3096E-03
1.2500E 01	-2.5765E-03
1.3000E 01	-2.2330E-03
1.3500E 01	-1.3509E-03
1.4000E 01	-1.3676E-04
1.4500E 01	1.1411E-03
1.5000E 01	2.2277E-03
1.5500E 01	2.9394E-03
1.6000E 01	3.1960E-03
1.6500E 01	3.0224E-03
1.7000E 01	2.5269E-03
1.7500E 01	1.8631E-03
1.8000E 01	1.1884E-03
1.8500E 01	6.2954E-04
1.9000E 01	2.6052E-04
1.9500E 01	9.6769E-05
2.0000E 01	1.0363E-04
2.0500E 01	2.1453E-04
2.1000E 01	3.5302E-04
2.1500E 01	4.5284E-04
2.2000E 01	4.7180E-04
2.2500E 01	3.9744E-04
2.3000E 01	2.4456E-04
2.3500E 01	4.6920E-05
2.4000E 01	-1.5417E-04
2.4500E 01	-3.2094E-04
2.5000E 01	-4.2748E-04

FIGURE 6-17 RELATIVE ANGULAR POSITION BODY 4

MINIMUM -2.6316E 03 U1 VERSUS TIME MAXIMUM 3.5446E 02

TIME	U1
0.0	-2.6316E 03
5.0000E-01	-1.2054E 03
1.0000E 00	-3.9206E 02
1.5000E 00	4.6013E 01
2.0000E 00	2.5954E 02
2.5000E 00	3.4295E 02
3.0000E 00	3.5446E 02
3.5000E 00	3.2926E 02
4.0000E 00	2.8804E 02
4.5000E 00	2.4244E 02
5.0000E 00	1.9866E 02
5.5000E 00	1.5959E 02
6.0000E 00	1.2628E 02
6.5000E 00	9.8718E 01
7.0000E 00	7.6424E 01
7.5000E 00	5.8689E 01
8.0000E 00	4.4763E 01
8.5000E 00	3.3944E 01
9.0000E 00	2.5612E 01
9.5000E 00	1.9240E 01
1.0000E 01	1.4398E 01
1.0500E 01	1.0738E 01
1.1000E 01	7.9842E 00
1.1500E 01	5.9203E 00
1.2000E 01	4.3791E 00
1.2500E 01	3.2319E 00
1.3000E 01	2.3803E 00
1.3500E 01	1.7499E 00
1.4000E 01	1.2842E 00
1.4500E 01	9.4095E-01
1.5000E 01	6.8844E-01
1.5500E 01	5.0301E-01
1.6000E 01	3.6706E-01
1.6500E 01	2.6754E-01
1.7000E 01	1.9479E-01
1.7500E 01	1.4167E-01
1.8000E 01	1.0294E-01
1.8500E 01	7.4731E-02
1.9000E 01	5.4204E-02
1.9500E 01	3.9284E-02
2.0000E 01	2.8449E-02
2.0500E 01	2.0588E-02
2.1000E 01	1.4888E-02
2.1500E 01	1.0760E-02
2.2000E 01	7.7710E-03
2.2500E 01	5.6093E-03
2.3000E 01	4.0466E-03
2.3500E 01	2.9177E-03
2.4000E 01	2.1026E-03
2.4500E 01	1.5145E-03
2.5000E 01	1.0904E-03

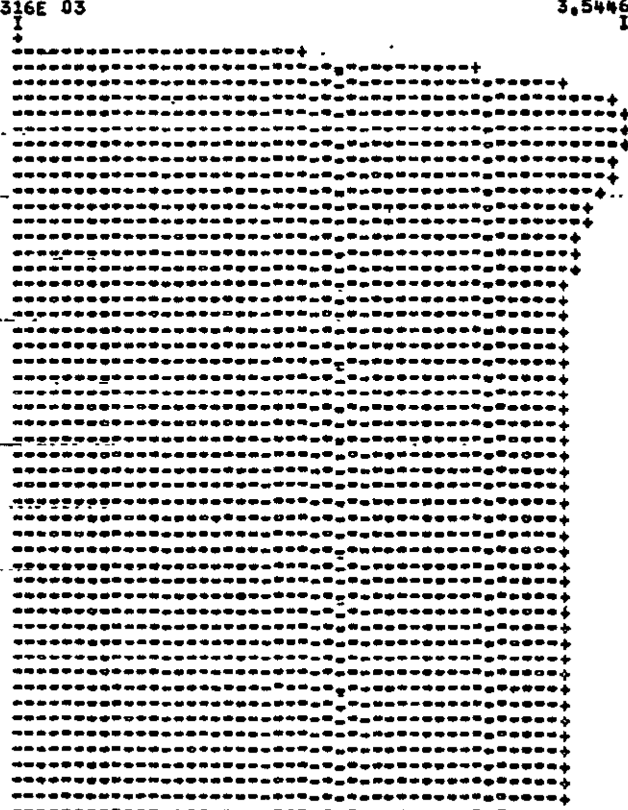


FIGURE 6-18 CONTROL TORQUE BODY 1

MINIMUM -9.0715E 00 U2 VERSUS TIME MAXIMUM 6.4731E 00

TIME	U2
0.0	0.0
5.0000E-01	-8.5639E 00
1.0000E 00	-9.0715E 00
1.5000E 00	-6.4126E 00
2.0000E 00	-3.3086E 00
2.5000E 00	-9.7164E-01
3.0000E 00	3.5371E-01
3.5000E 00	9.4438E-01
4.0000E 00	1.2534E 00
4.5000E 00	1.6740E 00
5.0000E 00	2.4134E 00
5.5000E 00	3.4642E 00
6.0000E 00	4.6487E 00
6.5000E V0	5.7028E 00
7.0000E 00	6.3692E 00
7.5000E 00	6.4731E 00
8.0000E 00	5.9639E 00
8.5000E 00	4.9188E 00
9.0000E 00	3.5142E 00
9.5000E 00	1.9770E 00
1.0000E 01	5.3072E-01
1.0500E U1	-6.4975E-01
1.1000E 01	-1.4659E 00
1.1500E 01	-1.9023E 00
1.2000E 01	-2.0139E 00
1.2500E 01	-1.9011E 00
1.3000E 01	-1.6787E 00
1.3500E 01	-1.4487E 00
1.4000E 01	-1.2808E 00
1.4500E 01	-1.2041E 00
1.5000E 01	-1.2103E 00
1.5500E 01	-1.2644E 00
1.6000E 01	-1.3199E 00
1.6500E 01	-1.3332E 00
1.7000E 01	-1.2755E 00
1.7500E 01	-1.1381E 00
1.8000E 01	-9.3195E-01
1.8500E 01	-6.8298E-01
1.9000E 01	-4.2413E-01
1.9500E U1	-1.8727E-01
2.0000E 01	3.5737E-03
2.0500E 01	1.3596E-01
2.1000E 01	2.0972E-01
2.1500E 01	2.3472E-01
2.2000E 01	2.2693E-01
2.2500E 01	2.0380E-01
2.3000E 01	1.8024E-01
2.3500E 01	1.6596E-01
2.4000E 01	1.6450E-01
2.4500E 01	1.7390E-01
2.5000E 01	1.8848E-01

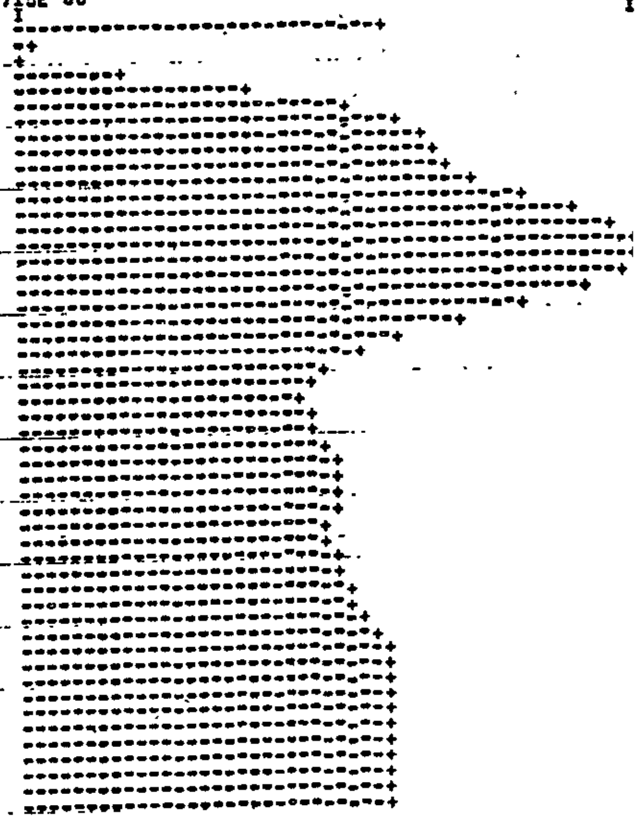
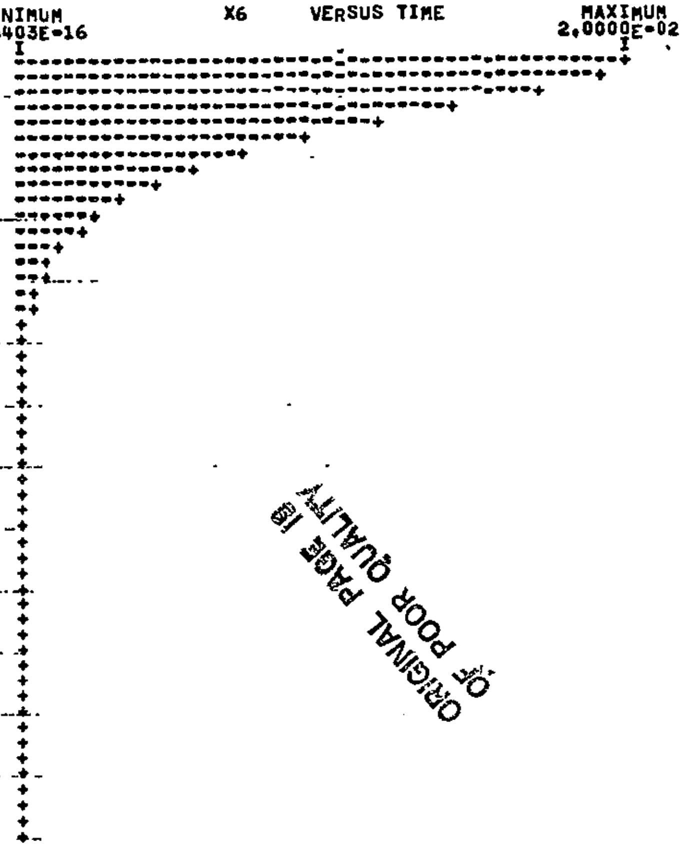


FIGURE 6-19 CONTROL TORQUE BODY 2



TIME	X6
0.0	2.0000E-02
5.0000E-01	1.9027E-02
1.0000E 00	1.6884E-02
1.5000E 00	1.4347E-02
2.0000E 00	1.1837E-02
2.5000E 00	9.5575E-03
3.0000E 00	7.5922E-03
3.5000E 00	5.9542E-03
4.0000E 00	4.6215E-03
4.5000E 00	3.5567E-03
5.0000E 00	2.7178E-03
5.5000E 00	2.0641E-03
6.0000E 00	1.5595E-03
6.5000E 00	1.1730E-03
7.0000E 00	8.7870E-04
7.5000E 00	6.5594E-04
8.0000E 00	4.8812E-04
8.5000E 00	3.6222E-04
9.0000E 00	2.6810E-04
9.5000E 00	1.9799E-04
1.0000E 01	1.4590E-04
1.0500E 01	1.0732E-04
1.1000E 01	7.8794E-05
1.1500E 01	5.7759E-05
1.2000E 01	4.2276E-05
1.2500E 01	3.0901E-05
1.3000E 01	2.2557E-05
1.3500E 01	1.6447E-05
1.4000E 01	1.1978E-05
1.4500E 01	8.7143E-06
1.5000E 01	6.3337E-06
1.5500E 01	4.5991E-06
1.6000E 01	3.3367E-06
1.6500E 01	2.4188E-06
1.7000E 01	1.7520E-06
1.7500E 01	1.2681E-06
1.8000E 01	9.1725E-07
1.8500E 01	6.6301E-07
1.9000E 01	4.7894E-07
1.9500E 01	3.4576E-07
2.0000E 01	2.4948E-07
2.0500E 01	1.7991E-07
2.1000E 01	1.2967E-07
2.1500E 01	9.3413E-08
2.2000E 01	6.7263E-08
2.2500E 01	4.8411E-08
2.3000E 01	3.4827E-08
2.3500E 01	2.5045E-08
2.4000E 01	1.8003E-08
2.4500E 01	1.2936E-08
2.5000E 01	9.2916E-09

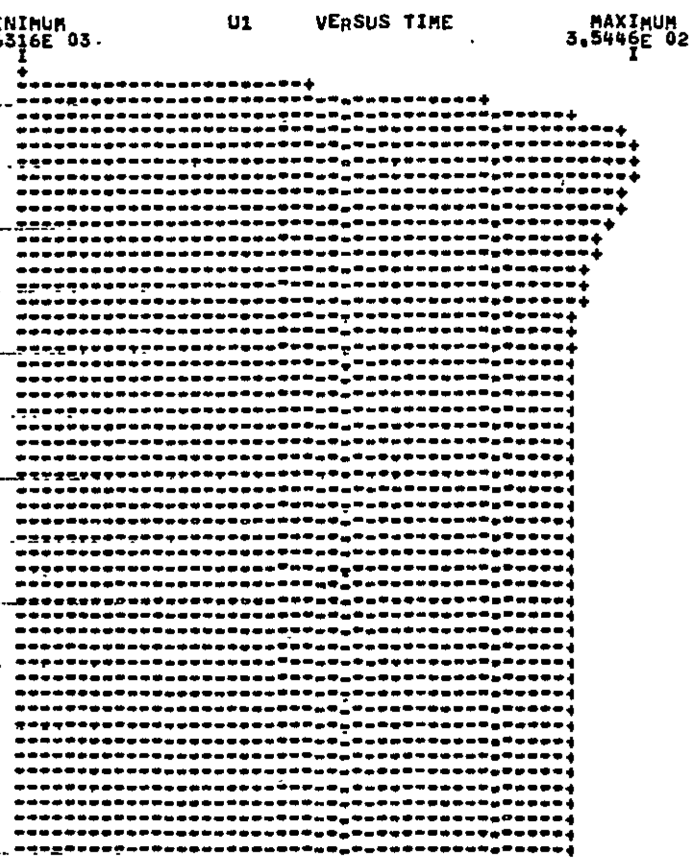
FIGURE 6-20 ANGULAR POSITION BODY 1

TIME	X4
0.0	0.0
5.0000E-01	-2.1386E-03
1.0000E 00	-1.1219E-02
1.5000E 00	-2.0854E-02
2.0000E 00	-2.4125E-02
2.5000E 00	-1.9288E-02
3.0000E 00	-8.8457E-03
3.5000E 00	3.1055E-03
4.0000E 00	1.3037E-02
4.5000E 00	1.9004E-02
5.0000E 00	2.0693E-02
5.5000E 00	1.8931E-02
6.0000E 00	1.5053E-02
6.5000E 00	1.0387E-02
7.0000E 00	5.9495E-03
7.5000E 00	2.3372E-03
8.0000E 00	-2.2932E-04
8.5000E 00	-1.7982E-03
9.0000E 00	-2.5643E-03
9.5000E 00	-2.7689E-03
1.0000E 01	-2.6342E-03
1.0500E 01	-2.3316E-03
1.1000E 01	-1.9751E-03
1.1500E 01	-1.6296E-03
1.2000E 01	-1.3244E-03
1.2500E 01	-1.0673E-03
1.3000E 01	-8.5526E-04
1.3500E 01	-6.8130E-04
1.4000E 01	-5.3852E-04
1.4500E 01	-4.2128E-04
1.5000E 01	-3.2542E-04
1.5500E 01	-2.4784E-04
1.6000E 01	-1.8600E-04
1.6500E 01	-1.3764E-04
1.7000E 01	-1.0058E-04
1.7500E 01	-7.2747E-05
1.8000E 01	-5.2220E-05
1.8500E 01	-3.7311E-05
1.9000E 01	-2.6599E-05
1.9500E 01	-1.8952E-05
2.0000E 01	-1.3505E-05
2.0500E 01	-9.6199E-06
2.1000E 01	-6.8425E-06
2.1500E 01	-4.8524E-06
2.2000E 01	-3.4264E-06
2.2500E 01	-2.4073E-06
2.3000E 01	-1.6832E-06
2.3500E 01	-1.1727E-06
2.4000E 01	-8.1601E-07
2.4500E 01	-5.6870E-07
2.5000E 01	-3.9817E-07

FIGURE 6-21 RELATIVE ANGULAR POSITION BODY 2

TIME	X5
0.0	0.0
5.0000E-01	3.1048E-03
1.0000E 00	1.4193E-02
1.5000E 00	2.5790E-02
2.0000E 00	3.0250E-02
2.5000E 00	2.5514E-02
3.0000E 00	1.4151E-02
3.5000E 00	5.7218E-04
4.0000E 00	-1.1289E-02
4.5000E 00	-1.9116E-02
5.0000E 00	-2.2339E-02
5.5000E 00	-2.1655E-02
6.0000E 00	-1.8387E-02
6.5000E 00	-1.3927E-02
7.0000E 00	-9.3920E-03
7.5000E 00	-5.4872E-03
8.0000E 00	-2.5274E-03
8.5000E 00	-5.3521E-04
9.0000E 00	6.3809E-04
9.5000E 00	1.2083E-03
1.0000E 01	1.3873E-03
1.0500E 01	1.3460E-03
1.1000E 01	1.2029E-03
1.1500E 01	1.0294E-03
1.2000E 01	8.6165E-04
1.2500E 01	7.1349E-04
1.3000E 01	5.8712E-04
1.3500E 01	4.8003E-04
1.4000E 01	3.8887E-04
1.4500E 01	3.1105E-04
1.5000E 01	2.4492E-04
1.5500E 01	1.8949E-04
1.6000E 01	1.4398E-04
1.6500E 01	1.0751E-04
1.7000E 01	7.9056E-05
1.7500E 01	5.7406E-05
1.8000E 01	4.1307E-05
1.8500E 01	2.9558E-05
1.9000E 01	2.1100E-05
1.9500E 01	1.5059E-05
2.0000E 01	1.0754E-05
2.0500E 01	7.6804E-06
2.1000E 01	5.4770E-06
2.1500E 01	3.8919E-06
2.2000E 01	2.7505E-06
2.2500E 01	1.9309E-06
2.3000E 01	1.3464E-06
2.3500E 01	9.3361E-07
2.4000E 01	6.4540E-07
2.4500E 01	4.4636E-07
2.5000E 01	3.1003E-07

FIGURE 6-22 RELATIVE ANGULAR POSITION
BODY 4



TIME	U1
0.0	-2.6316E 03
5.0000E-01	-1.2054E 03
1.0000E 00	-3.9206E 02
1.5000E 00	4.6013E 01
2.0000E 00	2.5954E 02
2.5000E 00	3.4295E 02
3.0000E 00	3.5446E 02
3.5000E 00	3.2926E 02
4.0000E 00	2.8804E 02
4.5000E 00	2.4244E 02
5.0000E 00	1.9866E 02
5.5000E 00	1.5959E 02
6.0000E 00	1.2628E 02
6.5000E 00	9.8718E 01
7.0000E 00	7.6424E 01
7.5000E 00	5.8689E 01
8.0000E 00	4.4763E 01
8.5000E 00	3.3944E 01
9.0000E 00	2.5612E 01
9.5000E 00	1.9240E 01
1.0000E 01	1.4398E 01
1.0500E 01	1.0738E 01
1.1000E 01	7.9842E 00
1.1500E 01	5.9203E 00
1.2000E 01	4.3791E 00
1.2500E 01	3.2319E 00
1.3000E 01	2.3803E 00
1.3500E 01	1.7499E 00
1.4000E 01	1.2842E 00
1.4500E 01	9.4095E-01
1.5000E 01	6.8844E-01
1.5500E 01	5.0301E-01
1.6000E 01	3.6706E-01
1.6500E 01	2.6754E-01
1.7000E 01	1.9479E-01
1.7500E 01	1.4167E-01
1.8000E 01	1.0294E-01
1.8500E 01	7.4731E-02
1.9000E 01	5.4204E-02
1.9500E 01	3.9284E-02
2.0000E 01	2.8449E-02
2.0500E 01	2.0588E-02
2.1000E 01	1.4888E-02
2.1500E 01	1.0760E-02
2.2000E 01	7.7710E-03
2.2500E 01	5.6093E-03
2.3000E 01	4.0466E-03
2.3500E 01	2.9177E-03
2.4000E 01	2.1026E-03
2.4500E 01	1.5145E-03
2.5000E 01	1.0904E-03

FIGURE 6-23 CONTROL TORQUE BODY 1

MINIMUM -3.0637E 01   U2 VERSUS TIME   MAXIMUM 9.5439E 00

TIME	U2
0.0	0.0
5.0000E-01	-3.0637E 01
1.0000E 00	-1.1177E 01
1.5000E 00	4.7994E 00
2.0000E 00	7.8507E 00
2.5000E 00	3.4633E 00
3.0000E 00	-1.5327E 00
3.5000E 00	-3.4673E 00
4.0000E 00	-1.9185E 00
4.5000E 00	1.7064E 00
5.0000E 00	5.5954E 00
5.5000E 00	8.4034E 00
6.0000E 00	9.5439E 00
6.5000E 00	9.0903E 00
7.0000E 00	7.5086E 00
7.5000E 00	5.3841E 00
8.0000E 00	3.2282E 00
8.5000E 00	1.3843E 00
9.0000E 00	1.4718E-02
9.5000E 00	-8.6282E-01
1.0000E 01	-1.3206E 00
1.0500E 01	-1.4696E 00
1.1000E 01	-1.4222E 00
1.1500E 01	-1.2709E 00
1.2000E 01	-1.0807E 00
1.2500E 01	-8.9105E-01
1.3000E 01	-7.2141E-01
1.3500E 01	-5.7821E-01
1.4000E 01	-4.6075E-01
1.4500E 01	-3.6544E-01
1.5000E 01	-2.8813E-01
1.5500E 01	-2.2530E-01
1.6000E 01	-1.7426E-01
1.6500E 01	-1.3305E-01
1.7000E 01	-1.0017E-01
1.7500E 01	-7.4351E-02
1.8000E 01	-5.4464E-02
1.8500E 01	-3.9450E-02
1.9000E 01	-2.8326E-02
1.9500E 01	-2.0222E-02
2.0000E 01	-1.4391E-02
2.0500E 01	-1.0233E-02
2.1000E 01	-7.2785E-03
2.1500E 01	-5.1791E-03
2.2000E 01	-3.6636E-03
2.2500E 01	-2.6149E-03
2.3000E 01	-1.8499E-03
2.3500E 01	-1.3028E-03
2.4000E 01	-9.1307E-04
2.4500E 01	-6.3733E-04
2.5000E 01	-4.4387E-04

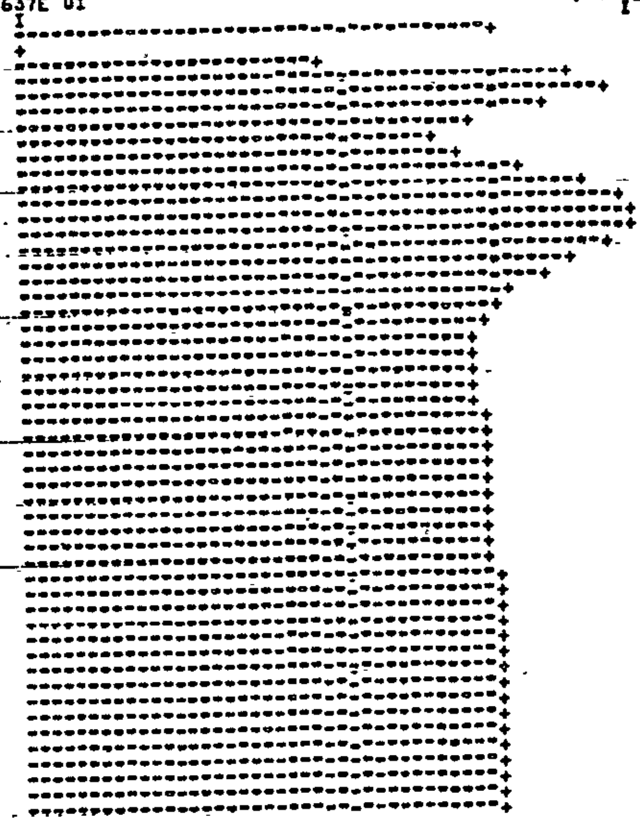


FIGURE 2-24 CONTROL TORQUE BODY 2

3. The maximum absolute value of τ_{1Z} increases exponentially as the rigid body dynamics are moved farther into the left half plane. See Figure 6-25.

4. The maximum absolute value of τ_{2Z} is proportional to the peak to peak excursions in the state variables associated with the solar wings. From Table 6-2 the feedback gains increase significantly as the real part of the eigenvalues increase. Also the rate of increase in the gains associated with ψ_{21} and ψ_{42} is greater than the rate of increase in the gains associated with ω_{21} and ω_{42} as Re(λ) increases. The significance of this will appear when sensor failure studies are undertaken.

The above analysis relates to the time domain simulation of the Z axis reduced order model. Application of the control laws developed above were applied to the full scale five-body three-axis simulation.

These results are provided in Figures 6-26 through 6-30 for eigenvalue sets c1 and b2 (corresponding to Figures 6-10 to 6-14 of the ROM). A comparison of the simulations for the full order model (FOM) with the simulations of the Z-axis reduced order model (ROM) demonstrates the effectiveness of the design method and the validity of the model reduction procedure.

The simulation results for the FOM for the other eigenvalue sets obtained using the ROM control also showed excellent comparison with the ROM simulation results.

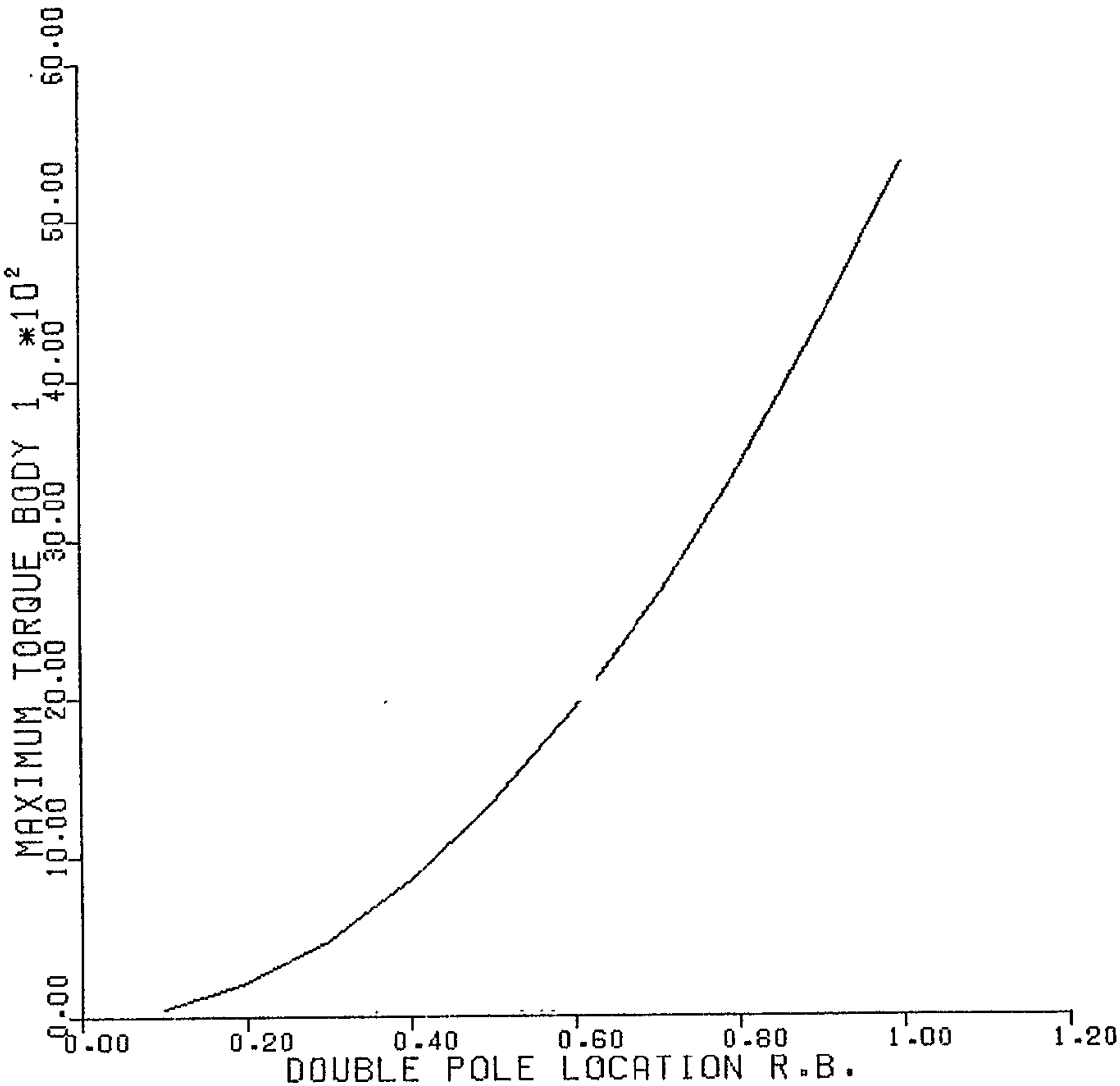


FIGURE 6-25 MAXIMUM TORQUE $|\tau_{1z}|$ VS POLE LOCATION FOR RIGID BODY

TABLE 6-2 . GAIN MATRIX FOR τ_{2Z}

$$\tau_{2Z} \doteq - Kx(t)$$

REAL (λ)	ω_1	ω_{21}	ψ_{42}	ψ_{21}	ψ_{42}	ψ_1
0.10	0.0	1433.2	1140.2	68.411	30.98	0.0
0.20	0.0	3045.5	2449.4	291.98	124.97	0.0
0.70	0.0	19199.	17067.	5193.1	3003.8	0.0

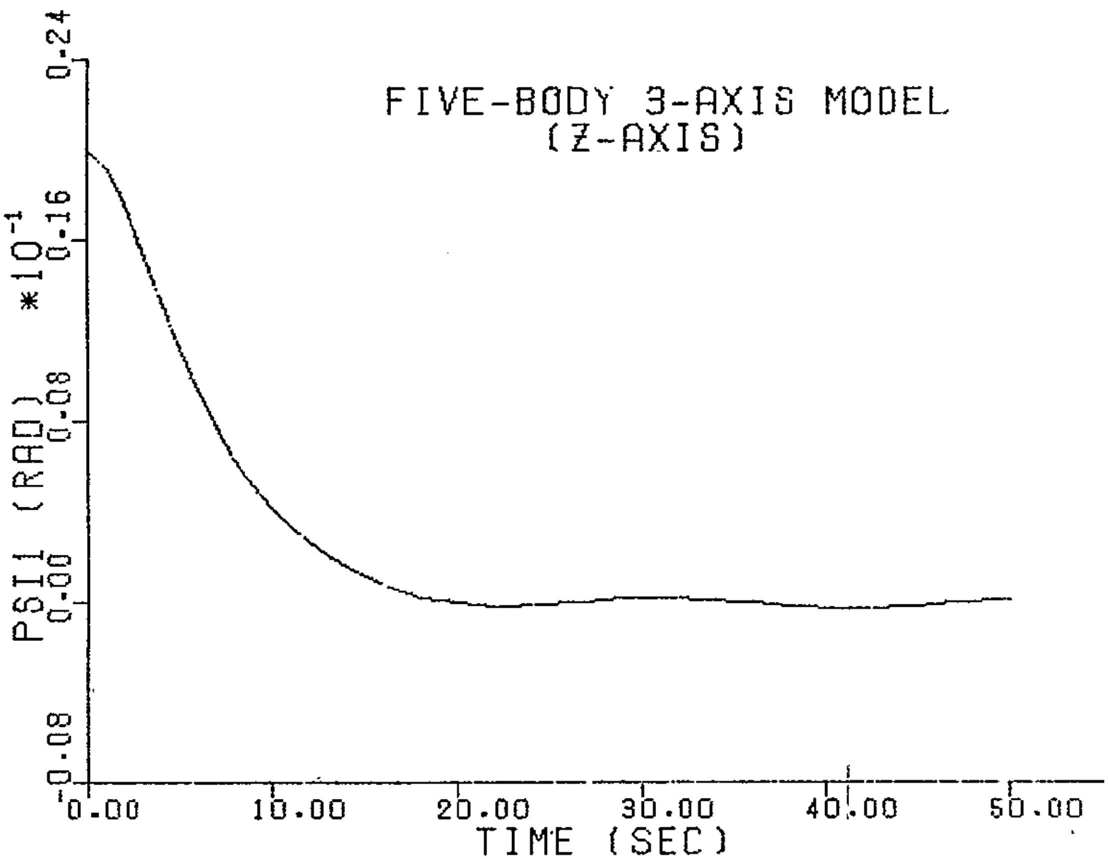


FIGURE 6-26 ANGULAR POSITION BODY 1

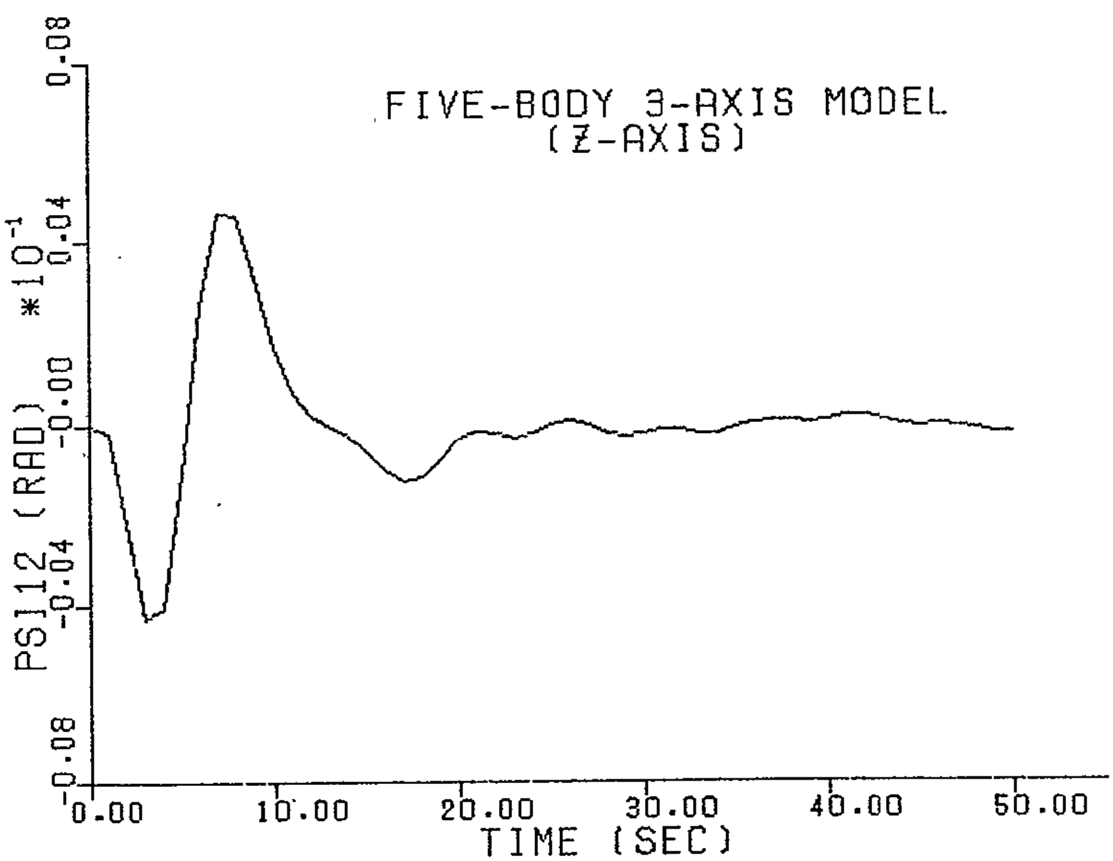


FIGURE 6-27 RELATIVE ANGULAR POSITION BODY 2

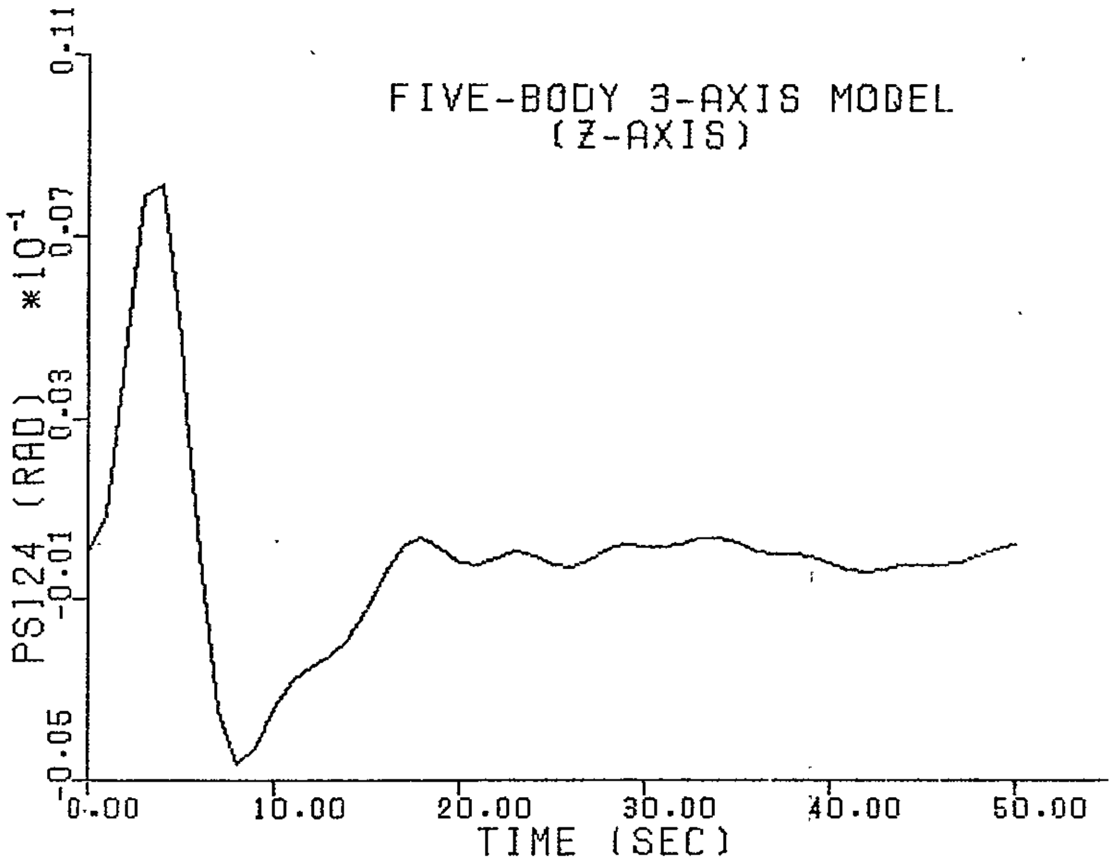


FIGURE 6-28 RELATIVE ANGULAR POSITION BODY 4

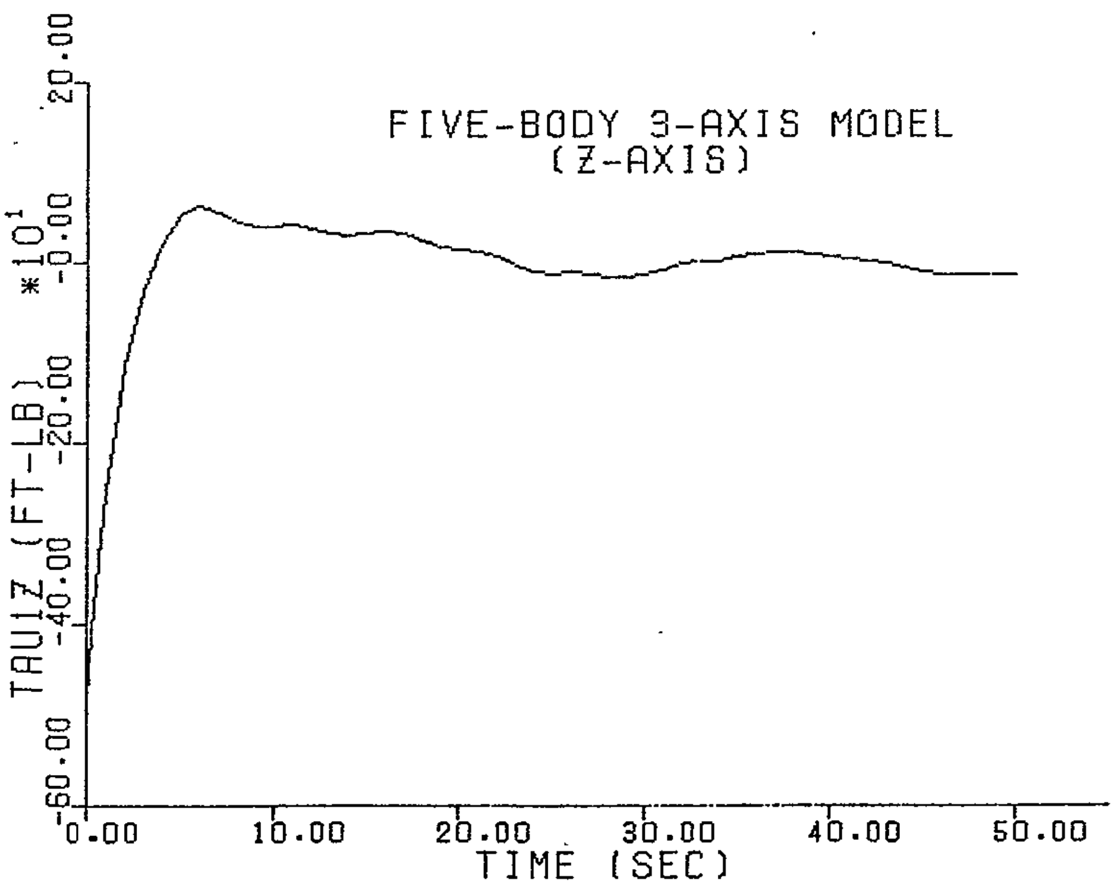


FIGURE 6-29 CONTROL TORQUE BODY 1

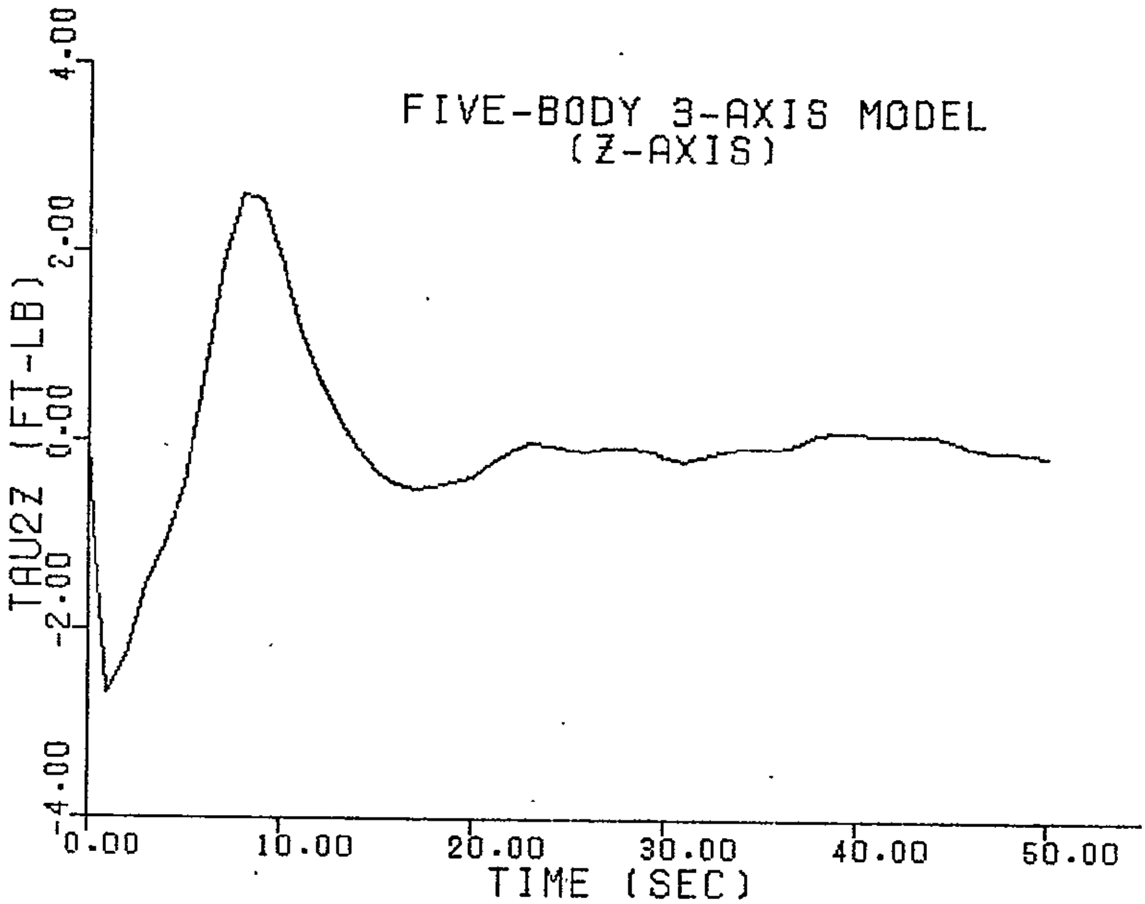


FIGURE 6-30 CONTROL TORQUE BODY 2

6.4 CONCLUSIONS AND RECOMMENDATIONS

An eigenvalue analysis of the five-body three-axis Space Construction Base/Configuration I vehicle shows that the eigenvalue shifts from a double pole configuration are due to the interaxis coupling of the solar wings. Cross-axis coupling for this vehicle has been shown to be negligible thus leading to the conclusion that from a control design viewpoint, each axis can be designed separately.

Using a symmetric reduced order model for the torsional axis, two new design procedures were studied. The multivariable Nyquist array method, a frequency domain design technique, was shown to be effective for the difficult case of the flexible modes within the control system bandwidth. Utilization of the multivariable Bode diagram facilitated the design process since standard single-input single-output methods could be used. The Retallack pole placement technique when coupled with a computationally efficient numerical algorithm to obtain the Luenberger canonical form was effective in placing specific open loop poles in desired positions. Time domain simulations demonstrated the potential of this method.

It is apparent from the results obtained that the methods used in this study should be investigated further. Specifically, several areas of consideration are identified:

a) Design and evaluation associated with pole shifts in frequency as well as in damping ratio.

b) Repeat design for the Y axis with and without the symmetry assumption. Compare designs using both MNA and pole placement procedures.

c) Repeat the design for the X axis using MNA and pole placement.

d) Sensitivity analysis of the control configuration under model parameter uncertainties.

e) Sensor failure analysis in all axes and a simplification in the system gain space description for failure accommodation.

f) Develope a test for robustness of the control design as a means of simplifying the design for future configuration studies.

g) Incorporate design constraints on control magnitude and state measurement in the selection of control weighting vectors used in the pole placemant procedure.

h) Incorporate gain magnitude constraints and develop a criteria for gain selection based upon time domain waveforms.

i) Consider a Kalman pole placement algorithm to sequentially place poles in desired locations using the criteria suggested above.

j) Compare results using standard pole placement (Simon and Mitter) techniques and evaluate subsequent designs for robustness.

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SECTION 7

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7.0 ALTERNATE CONTROL APPROACHES

Among alternate approaches to the application of control to the Space Construction Base one of the most promising appears to be the general one presented in this section. In the sequel this approach is developed for a plant (system to be controlled) that may be represented by a broad class of linear, constant parameter multivariable mathematical models.

The general development of this approach begins with a description of the salient characteristics of the class of linear constant parameter multivariable plants for which the approach is applicable. The matrix properties of the plants are then utilized in the development of techniques for the generation of state regulator control and estimation gain matrices that optimize plant performance.

Following the development of the general approach to the design of state controllers and estimators for this class of linear constant parameter multivariable plants, the considerations involved in applying this general approach to the rotational mathematical model of the Space Construction Base are discussed. These considerations include treatment of cyclical aerodynamic disturbance torques, selection of weighting coefficients for state variable estimation error in the computation of optimal estimator gain and decomposition of the known portion of input disturbances into terms corresponding to gravity gradient, actuator reaction and actuator desaturation torques.

7.1 LINEAR, CONSTANT PARAMETER, MULTIVARIABLE CONTROL APPROACH

7.1.1 Plant

Consider the following plant

$$\dot{\underline{x}}_p = A_p\underline{x}_p + C(\underline{u}+\underline{v}) + D\underline{w} \tag{7-1}$$

$$\underline{y} = B_p\underline{x}_p \tag{7-2}$$

where:

$\underline{x}_p$ = plant state vector of dimension n

$\underline{u}$ = plant control vector of dimension c

$\underline{v}$ = plant control disturbance vector of dimension c

$\underline{w}$ = plant disturbance vector of dimension d

$\underline{y}$ = plant measurement vector of dimension m

A_p = uncontrolled plant matrix of dimension nxn

C = plant control matrix of dimension nxc

D = plant disturbance matrix of dimension nxd

B_p = plant measurement matrix of dimension mxn

Suppose that the jth column of the plant control matrix is linearly dependent. Then we can write:

$$\begin{aligned} C(\underline{u}+\underline{v}) &= C_j(\underline{u}_j+\underline{v}_j)+\underline{c}_j(u_j+v_j) \\ &= C_j(\underline{u}_j+\underline{v}_j)+C_j\underline{c}(u_j+v_j) \\ &= C_j\left[\underline{u}_j+\underline{v}_j+(u_j+v_j)\underline{c}\right] = C'(\underline{u}_j' + \underline{v}_j') \end{aligned} \tag{7-3}$$

where:

C_j = C minus the jth column

$\underline{u}_j$ = $\underline{u}$ minus the jth component

$\underline{v}_j$ = $\underline{v}$ minus the jth component

$\underline{c}_j$ = jth column of C
u_j = jth component of $\underline{u}$
v_j = jth component of $\underline{v}$
$\underline{c}$ = constant vector of dimension c-1 .

Thus we can assume, without loss of generality, that C has rank c. If M is a real symmetric matrix, then M and M^TM have the same rank. Hence, defining:

$$M^* \equiv (M^TM)^{-1}M^T \tag{7-4}$$

we can write:

$$C(\underline{u}+\underline{v})+D\underline{w}=C(\underline{u}+\underline{v}+C^*D\underline{w})+(I-CC^*)D\underline{w}$$

$$= C(\underline{u}+\underline{v}')+D'\underline{w} \tag{7-5}$$

Since C^TD';=0, we can assume without loss of generality that the columns of C are orthogonal to the columns of the plant disturbance matrix. Now suppose that the ith row of the plant measurement matrix is linearly dependent. Then we can write:

$$B'_p\underline{x}_p=\underline{y}' \tag{7-6}$$

$$y_i=\left[(B'_p)^T\underline{c}\right]^T\underline{x}_p=\underline{c}^T\underline{y}' \tag{7-7}$$

where:

B'_p = B_p minus the ith row
$\underline{y}'$ = $\underline{y}$ minus the ith component
y_i = The ith component of $\underline{y}$
$\underline{c}$ = a constant vector of dimension m-1

Thus we can assume without loss of generality that B_p has rank m. Furthermore, it is assumed that:

1) $c < n$ and $m \leq n$
2) All matrices are constant
3) The unknown part of $\underline{v}$ and $\underline{w}$ can be written as $B_d \underline{x}_d$ where $\underline{x}_d$ satisfies the following matrix differential equation.

$$\dot{\underline{x}}_d = A_d \underline{x}_d \tag{7-8}$$

That is,

$$\underline{v} = \underline{v}_k + B_v \underline{x}_v \tag{7-9}$$

where:

$$\dot{\underline{x}}_v = A_v \underline{x}_v \tag{7-10}$$

and

$$\underline{w} = \underline{w}_k + B_w \underline{x}_w \tag{7-11}$$

where:

$$\dot{\underline{x}}_w = A_w \underline{x}_w \tag{7-12}$$

7.1.2 Design of State Feedback Controller

We wish to design a state feedback control system for this plant so that the plant state vector will remain near some equilibrium plant state vector $(\underline{x}_p)_d$.

Since $A_p(\underline{x}_p)_d = 0$, (7-13)

we can write:

$$\dot{\underline{x}}'_p = A_p \underline{x}'_p + C(\underline{u}+\underline{v})+D\underline{w} \tag{7-14}$$

$$\underline{y}' = B_p\underline{x}'_p \qquad (7\text{-}15)$$

where:

$$\underline{x}'_p = \underline{x}_p - (\underline{x}_p)_d \qquad (7\text{-}16)$$

and

$$\underline{y}' = \underline{y} - B_p(\underline{x}_p)_d \qquad (7\text{-}17)$$

Hence, we can assume without loss of generality that:

$$(x_p)_d = 0 \qquad (7\text{-}18)$$

Since

$$C^T D = 0, \qquad (7\text{-}19)$$

none of the plant disturbance vector can be cancelled by the plant control vector. However, all of the plant control disturbance vector can be cancelled. Therefore, we let:

$$\underline{u} = \underline{g}(\underline{x}_p) - \underline{v} \qquad (7\text{-}20)$$

To simplify the design, we will limit the feedback structure to a linear,time-invariant function so that

$$\underline{u} = -G\underline{x}_p - \underline{v} \qquad (7\text{-}21)$$

where G is a controller gain matrix of dimension c x n. Substituting equation (7-21) into equation (7-1) yields:

$$\dot{\underline{x}}_p = A_c\underline{x}_p + D\underline{w} \qquad (7\text{-}22)$$

where the controlled plant matrix may be expressed:

$$A_c = A_p - CG \qquad (7\text{-}23)$$

Note that if we could choose G such that

$$A_c = -\frac{1}{T} I, \qquad (7\text{-}24)$$

where I = identity matrix of the same dimensions as A_c, then the present plant state vector would be

$$\underline{x}_p(t) = e^{-\frac{t}{T}} \underline{x}_p(0) + D\int_0^t e^{\frac{\tau-t}{T}} \underline{w}(\tau)d\tau \qquad (7\text{-}25)$$

where $\underline{x}_p(0)$ is the initial plant state vector. This would be a desirable choice for G since, under the assumption that T is small, only recent, large plant disturbances could cause the present plant state not to be small. However, since c is less than n, there generally is no matrix G that will satisfy equation (7-24). Therefore we will choose G to render a measure of the difference between the two matrices in equation (7-24) as small as possible.

We could define the measure of the difference between these two matrices in the same way as for the measure of the difference between two vectors as $(trE^T{}_c E_c)^{\frac{1}{2}}$ where:

$$E_c = A_c + \frac{1}{T}I \qquad (7\text{-}26)$$

This yields the following solution.

$$G = C^*(A_p + \frac{1}{T}I) \qquad (7\text{-}27)$$

(The derivation and analysis of this solution appear in Appendix C)

However, we wish to make E_c small in the sense that for any $\underline{x}_p$, $E_c\underline{x}_p$ is small compared with $\underline{x}_p$. Furthermore, for various physical reasons, some plant state variables or combinations of plant state variables may be more important to control than others. Consequently we will

choose G to minimize the following quantity:

$$\max_{\underline{z}\neq o} \frac{|W_c E_c \underline{z}|}{|W_c \underline{z}|} \tag{7-28}$$

where the columns of W_c are linearly independent.

Since $W^T_c W_c$ is nonsingular, we can write:

$$\max_{\underline{z}\neq o} \frac{|W_c E_c \underline{z}|}{|W_c \underline{z}|} = \max_{\underline{z}\neq o} \frac{|E_c{}' \underline{z}'|}{|\underline{z}'|} \tag{7-29}$$

where

$$E_c{}' = W_c E_c W_c^* \tag{7-30}$$

$$\underline{z}' = W_c \underline{z} \tag{7-31}$$

Dividing the numerator and denominator of the right hand side by $|\underline{z}'|$ and then squaring, we see that the above problem is equivalent to choosing G to minimize the quantity:

$$\max_{|\underline{z}|=1} \underline{z}^T (E_c{}')^T E_c{}' \underline{z} \tag{7-32}$$

Introducing the constraint,

$$|\underline{z}| = 1, \tag{7-33}$$

by the Lagrange multiplier approach, a necessary condition for a critical value of $\underline{z}$ is:

$$\frac{\partial}{\partial \underline{z}}\left[\underline{z}^T (E_c{}')^T E_c{}' \underline{z} - \lambda(\underline{z}^T \underline{z} - 1)\right] = 0 \tag{7-34}$$

where $\frac{\partial}{\partial \underline{z}}$ indicates a gradient with respect to $\underline{z}$.

Completing the differentiation indicated on the left hand side and dividing by 2 yields:

$$\left[(E_c')^T \underline{E}_c' - \lambda I\right]\underline{z}=0 \tag{7-35}$$

Premultiplying both sides by $\underline{z}^T$ and rearranging terms yields:

$$\lambda = \underline{z}^T (E_c')^T E_c' \, \underline{z} \tag{7-36}$$

From equations (7-35) and (7-36), we see that:

$$\max_{|\underline{z}|=1} \underline{z}^T (E_c')^T E_c' z = \text{largest eigenvalue of } (E_c')^T E_c' \tag{7-37}$$

Hence, we wish to choose G such that Λ, the largest eigenvalue of $(E_c')^T E_c'$, is a minimum where:

$$E_c' = W_c (A_p - CG + \tfrac{1}{T} I) W_c^* \tag{7-38}$$

Since G is unconstrained, a necessary condition for the minimum value of Λ is

$$\frac{\partial \Lambda}{\partial G} = 0 \tag{7-39}$$

where $\frac{\partial}{\partial G}$ indicates the gradient with respect to G.

Furthermore, since $(E_c')^T E_c'$ is symmetric, Λ can be approximated by the fact that: $\Lambda = \lim\limits_{k \to \infty} \frac{|\underline{e}_{k+1}|}{|\underline{e}_k|}$ (7-40)

where:

$$\underline{e}_{k+1} = (E_c')^T E_c' \underline{e}_k \tag{7-41}$$

(Appendix D gives a numerical algorithm for generating the optimum controller gain matrix).

7.1.3 Design of State Estimator

The plant control given by equation (7-21) requires complete knowledge of the present plant state and control disturbance. Generally, these quantities are not completely known. However, they can be estimated from the known part of the past plant disturbances and the past plant measurements. Let $\underline{x}_e$ be defined as the solution to the following vector differential equation:

$$\dot{\underline{x}}_e = (A-HB)\underline{x}_e + \left[D^T \,\vdots\, 0 \,\vdots\, 0\right]^T \underline{w}_k + H\underline{y} \tag{7-42}$$

where:

$$A = \left[\begin{array}{c|c|c} A_c & 0 & DB_w \\ \hline 0 & A_v & 0 \\ \hline 0 & 0 & A_w \end{array}\right] \tag{7-43}$$

H = constant estimator gain matrix

$$B = \left[B_p \,\vdots\, 0 \,\vdots\, 0\right] \tag{7-44}$$

$$\underline{x}_e(0) = B^T(B_pB_p^T)^{-1}\underline{y}(0) \tag{7-45}$$

Combining the assumptions about the system disturbances with equations (7-2) and (7-22) yields:

$$\dot{\underline{x}} = A\underline{x} + \left[D^T \,\vdots\, 0 \,\vdots\, 0\right]^T \underline{w}_k \tag{7-46}$$

$$\underline{y} = B\underline{x} \tag{7-47}$$

where:

$$\underline{x} = \left[\underline{x}_p \,\vdots\, \underline{x}_v \,\vdots\, \underline{x}_w\right]^T \tag{7-48}$$

Subtracting equation (7-46) from equation (7-42) and substituting equation (7-47) for $\underline{y}$, it is evident that:

$$\Delta\dot{\underline{x}} = (A-HB)\,\Delta\underline{x} \tag{7-49}$$

where:

$$\underline{\Delta x} = \underline{x}_e - \underline{x} \tag{7-50}$$

Therefore, if we choose $\underline{H}$ to satisfy:

$$A - HB = -\frac{20}{T} I \tag{7-51}$$

then $\underline{x}_e$ would be a good estimate of $\underline{x}$ since the solution to equation (7-49) would be

$$\underline{\Delta x}(t) = \Delta x(0) e^{\frac{-20t}{T}} \tag{7-52}$$

However, since $m \leq n$, there exists no H such that equation (7-51) is satisfied. Furthermore, the estimator gain matrix that minimizes $(\mathrm{tr} E_e{}^T E_e)^{\frac{1}{2}}$

where: $$E_e = A - HB + \frac{20}{T} I \tag{7-53}$$

yields estimates for the unknown part of the control and plant disturbances of zero at all times. (See Appendix E for a derivation and analysis of this solution).

Consequently, we will choose H to minimize the largest eigenvalue of the matrix, $(E_e{}')^T E_e{}'$.

where:

$$E_e{}' = W_e E_e W_e^* \tag{7-54}$$

(See Appendix D for a numerical algorithm for generating the optimum estimator gain matrix.) Figure 7-1 depicts the relationships between the plant, state controller and state estimator in the complete system.

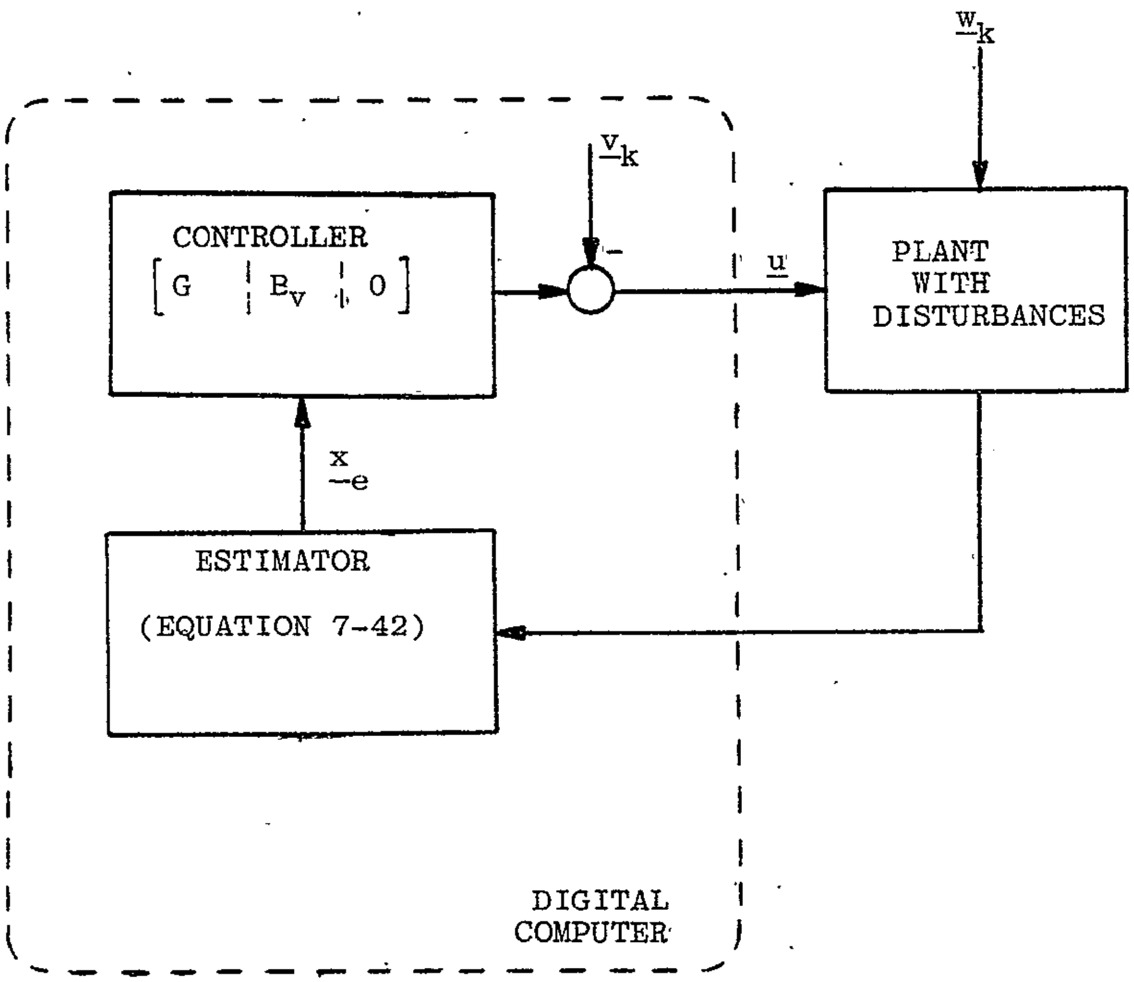

FIGURE 7-1

BLOCK DIAGRAM OF COMPLETE SYSTEM

7.1.4 System Design Parameters

Since the eigenvalues of equation (7-42) are approximately $-\frac{20}{T}$, the sampling frequency of the digital computer should be approximately $\frac{400}{T}$. The matrices C and B_p yield trade offs between control system performance and cost. The number of linearly independent actuators and sensors and, consequently, the system performance, increases as the ranks of these matrices increase. However, this better control system performance may not be worth the increased control system cost. The scalar T also affords a trade off between control system performance and cost. This trade off is more complex than those for C and B_p since smaller values of T not only increase control system cost but also may decrease control system performance. A control system simulation and trial and error will be necessary to choose the best values for C, B_p and T.

If a satisfactory control system cannot be found, it may be possible to significantly increase the performance and/or decrease the cost of the control system by making some relatively minor changes in the design of the uncontrolled plant. For instance, assume that

$$A_p = \left[f_{ij}(\underline{\pi})\right] \tag{7-55}$$

where $f_{ij}(\underline{\pi})$ is the ith row and jth column element of A_p and $\underline{\pi}$ is a vector of plant parameters which can be chosen to make control easier.

If we could render:

$$A_p = -\frac{1}{T}I \tag{7-56}$$

then G=0 and the control system would be optimal. However, since generally there will be no $\underline{\pi}$ such that these matrices are equal, we will render the difference between the two matrices of equation (7-56) as small as possible by choosing $\underline{\pi}$ to minimize the largest eigenvalue of $(E_p{}')^T E_p{}'$ where:

$$E_p{}' = W_c\left(\left[f_{ij}(\underline{\pi})\right] + \frac{1}{T}I\right)W_c^* \qquad (7\text{-}57)$$

7.2 APPLICATION TO SPACE BASE

A major problem in designing control systems for flexible spacecraft is the development of an accurate yet simple plant model. Because of the inherent difficulties of solving partial differential equations a finite element approach must be used. Space Base can be modeled as a number of rigid bodies connected in a tree configuration by either dissipative spring-hinges or electromagnetic torque actuators. The greater the number of rigid bodies used in the model, the better the accuracy of the model and hence the better the performance of the control system. However, if more rigid bodies are used than are necessary, then the order of the model and, consequently, the cost of the control system will be greater than necessary. It is conjectured that, for the control scheme of subsection 7.1, if the lowest resonant frequency of a physical structure is $\frac{20}{T}$ or higher, then that structure can be considered rigid.

Assuming that the control system is holding or very slowly changing the orientation of Space Base, the

equations of motion of the rigid body finite element model can be linearized and written in the form of equations (7-1) and (7-2) with the angular rate and position error of the most precisely pointed body and the relative angular rates and position of adjacent bodies as state variables.

7.2.1 Weighting of State Variables

There are two obvious reasons to weight the individual plant state variables when computing the optimum controller gain matrix. First, it makes no sense to add quantities of different physical dimensions such as angular rate and position. Second, it may be more important to control one section of Space Base than another. Consequently, if

$$\underline{x}_p = \left[\dot{\underline{\theta}}^T \;\vdots\; \underline{\theta}^T\right]^T \tag{7-58}$$

where the vector $\dot{\underline{\theta}}$ contains the angular rate plant state variables and the vector $\underline{\theta}$ contains the angular position plant state variables, then a logical choice for W_c would be:

$$W_c = \left[\begin{array}{c|c} TW & O \\ \hline O & W \end{array}\right] \tag{7-59}$$

where the scalar, T, nondimensionalizes the angular rate plant state variables and W is a positive definite diagonal matrix which weights the relative importance of controlling the individual angular position plant state variables. For this choice of W_c, we have:

$$W_c^* = (W_c^T W_c)^{-1} W_c^T = \left[\begin{array}{c|c} \frac{1}{T} W^{-1} & 0 \\ \hline 0 & W^{-1} \end{array}\right] \tag{7-60}$$

Furthermore, a better choice for the starting value of G in the algorithm of Appendix D might be:

$$K = (W_c C)^* W_c (A_p + \frac{1}{T} I) \tag{7-61}$$

7.2.2 Aerodynamic Disturbance Torque

Assuming the earth's gravity gradient disturbance torque to be computed and thus known, the primary unknown disturbance torque acting on Space Base is aerodynamic. Since this torque is approximately sinusoidal with orbit frequency, ω_o, we can write:

$$\dot{\underline{v}}_u = \underline{a} \cdot \cos \omega_o t + \underline{b} \sin \omega_o t \tag{7-62}$$

where $\underline{v}_u$ is the unknown part of the control disturbance torque and $\underline{a}$ and $\underline{b}$ are constant but unknown vectors. Differentiating $\underline{v}_u$ twice with respect to time yields:

$$\begin{bmatrix} \ddot{\underline{v}}_u \\ \dot{\underline{v}}_u \end{bmatrix} = \left[\begin{array}{c|c} 0 & -\omega_o^2 I \\ \hline I & 0 \end{array}\right] \begin{bmatrix} \dot{\underline{v}}_u \\ \underline{v}_u \end{bmatrix} \tag{7-63}$$

Accordingly,

$$\underline{x}_v = \left[\dot{\underline{v}}_u^T \;\vdots\; \underline{v}_u^T\right]^T \tag{7-64}$$

$$B_v = \left[0 \;\vdots\; I\right] \tag{7-65}$$

$$A_v = \left[\begin{array}{c|c} 0 & -\omega_o^2 I \\ \hline I & 0 \end{array}\right] \tag{7-66}$$

Similarly,

$$\underline{x}_w = \left[\dot{\underline{w}}_u^T \mid \underline{w}_u^T\right]^T \tag{7-67}$$

$$B_w = \left[0 \mid I\right] \tag{7-68}$$

$$A_w = \left[\begin{array}{c|c} 0 & -\omega_o^2 I \\ \hline I & 0 \end{array}\right] \tag{7-69}$$

7.2.3 Weighting Coefficients For Disturbance State Variable Estimation Error

It is reasonable in computing the optimum estimator gain matrix to weight various combinations of the disturbance state variable estimation errors according to the magnitude and location of the jerk, acceleration and velocity they cause. Thus a logical choice for W_e is:

$$
W_e = \left[\begin{array}{c|c|c|c|c}
W_c & 0 & 0 & 0 & 0 \\ \hline
0 & T^2 W_c C & 0 & 0 & 0 \\ \hline
0 & 0 & T W_c C & 0 & 0 \\ \hline
0 & 0 & 0 & T^2 W_c D & 0 \\ \hline
0 & 0 & 0 & 0 & T W_c D
\end{array}\right] \tag{7-70}
$$

For this choice of W_e, we have

$$
W_e^* = \left[\begin{array}{c|c|c|c|c}
W_c^* & 0 & 0 & 0 & 0 \\ \hline
0 & \frac{1}{T^2}(W_c C)^* & 0 & 0 & 0 \\ \hline
0 & 0 & \frac{1}{T}(W_c C)^* & 0 & 0 \\ \hline
0 & 0 & 0 & \frac{1}{T^2}(W_c D)^* & 0 \\ \hline
0 & 0 & 0 & 0 & \frac{1}{T}(W_c D)^*
\end{array}\right] \tag{7-71}
$$

7.2.4 Known Input and Plant Disturbances

Assuming the use of rigid body momentum exchange actuators, the known part of the input disturbance can be divided into three components: gravity gradient, actuator reaction and actuator desaturation as follows.

$$\underline{v}_k = \underline{v}_g + \underline{v}_r + \underline{v}_d. \tag{7-72}$$

The known part of the plant disturbance is just gravity gradient.

SECTION 8

SECTION 8

SECTION 8

8.0 STRUCTURAL ANALYSIS STUDY

The determination of flexibility body characteristics for a series of connected substructures is an important problem in the study of spacecraft dynamics. Assuming that the flexibility characteristics of each of the substructures comprising a vehicle system are known in terms of the free-free modes which are obtained from a discrete coordinate formulation of the individual substructures, a method (Reference 8-1) has been developed recently for combining the substructures by deriving the forces and torques that exist at the connection points between contiguous bodies while satisfying the appropriate boundary conditions. It is the objective of this section to determine the validity of the above proposed method by considering a homogeneous beam as an example.

8.1 SUMMARY OF APPROACH

A homogeneous beam made of steel is considered as the example to investigate the validity of the method mentioned above. Initially, the beam is idealized to be composed of elastically interconnected discrete rigid bodies with no damping mechanism involved. The springs connecting the bodies are assumed to be capable of having both translational and rotational motion. The free-free modes of the beam are determined from the equations of motion of the discrete rigid bodies constituting the beam. Next, the beam is halved and

each half of the beam is modelled in a similar manner as the total beam. Hence, the free-free modes of each half of the beam can be determined. Then the two half-beams are connected by two connection points; and, by writing the forces and torques that exist at the connection points, the equations of motion of the connected beam are developed to obtain the free-free modes of the connected beam. This result is compared to the modes of the beam obtained previously.

8.2 TECHNICAL DISCUSSION

The beam is subdivided into $2n$ rigid bodies. The adjacent rigid bodies are connected by springs which are capable of both translational and rotational motion. Thus the idealized model of the beam, illustrated in Figure 8-1, is composed of elastically interconnected discrete rigid bodies with no damping mechanism involved. Figure 8-2 and Table 8-1 explain some of the nomenclature used in this Section.

It is assumed that the discrete bodies composing the beam undergo deformations so small that only terms involving the first-degree deformations need be retained in the analysis. Further, the beam is allowed unrestricted motion in response to any applied forces and torques. Before proceeding with the analyses, it is necessary to define the reference frame with respect to which all measurements are made. If an inertially fixed reference frame is chosen, the deformations relative to the frame may grow large if the beam

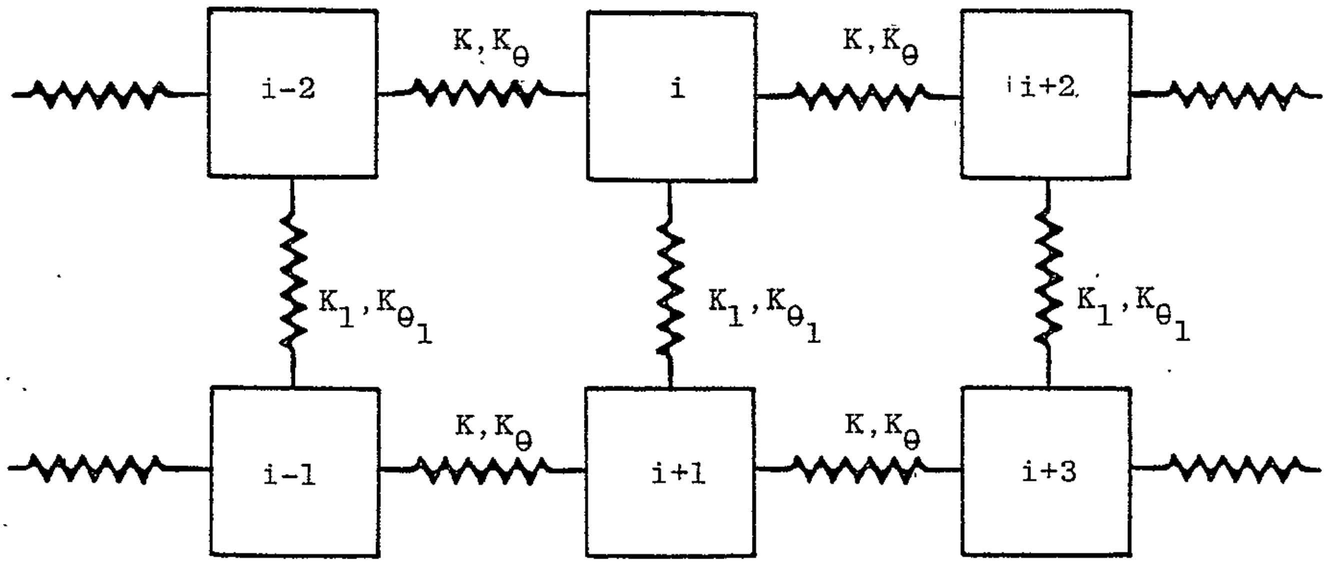

FIGURE 8-1 IDEALIZED MODEL OF THE BEAM

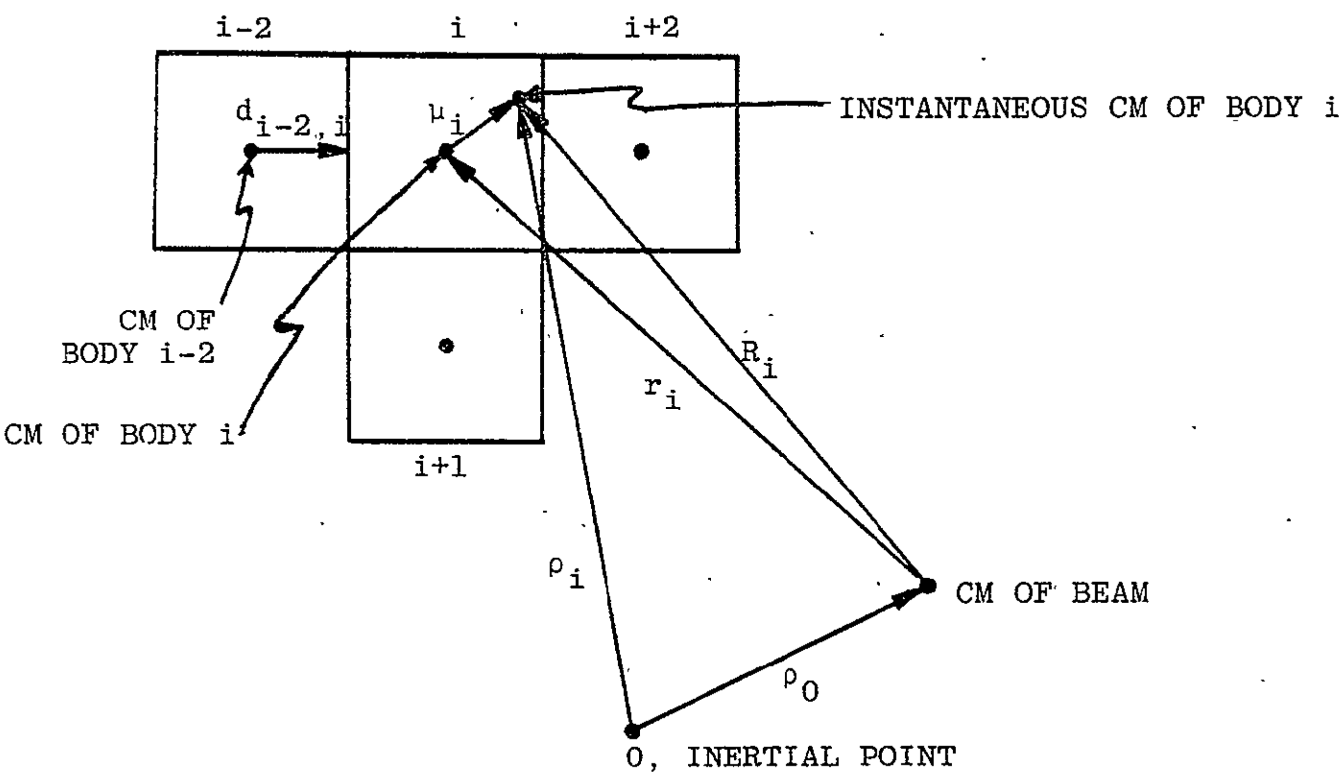

FIGURE 8-2 ILLUSTRATION OF SOME NOMENCLATURE

TABLE 8-1

NOMENCLATURE

ρ_o	vector from inertial point to CM of the beam
ρ_i	vector from inertial point to instantaneous (inst.) CM of body i
μ_i	vector from CM of body i to instantaneous (inst.) CM of body i
δ_i	vector from inst. CM of body i to an elemental mass in body i
γ_i	vector from CM of body i to the point of application of external force
ω_o	inertial rate of the rigid body frame of the total beam
ω_ℓ	inertial rate of the rigid body frame of the half beam #ℓ
β_i	angular rate of body i relative to the beam
ε_i	vector from the connection point to the CM of body i
d_{ij}	vector from the CM of body i to the interface point that lies on the line joining the CM's of bodies i and j.
F_{ij}	interface force between adjoining bodies i and j
$F_{c_{ij}}$	constraint force between adjoining bodies i and j
F_{e_i}	external force applied to body i
H_i	angular momentum of body i about the CM of the beam

TABLE 8-1 (CONT'D)

J_i	inertia of body i about its CM
K, K_1	translational stiffness matrix between adjoining bodies
K_θ, K_{θ_1}	rotational stiffness matrix between adjoining bodies
ℓ	refers to half-beam #1 for ℓ=1 and to half beam #2 for ℓ=2
m_i	mass of body i
M_{ij}	interface torque at the adjoining bodies of i and j
$M_{c_{ij}}$	constraint torque at the adjoining bodies of i and j
M_T	total mass of the beam
M_{T_ℓ}	mass of the half beam #ℓ
n	the number of bodies constituting a half beam, or one-half of the number of bodies composing the beam
Q_o, Q_2	vector of the deformation coordinates
r_i	vector from the CM of the beam to the CM of body i
${}_\ell r_i$	vector from the CM of half beam #ℓ to the CM of body i in the half beam
R_i	vector from the CM of the beam to inst. CM of body i
T_{e_i}	external torque applied to body i

undergoes an appreciable motion so that the analysis, using the assumption that the deformations are small, is not valid. However, if the reference frame is chosen such that it moves with the beam in a well-defined manner, then the deformations relative to this "floating" frame may be assumed to be small and hence the "first order deformations only" analysis can be carried out. The Tisserand frame (reference 8-2), with attractive properties for the purposes of this report, presents itself as such a floating reference frame. It is defined by the set of axes that moves in such a way as to set the internal angular momentum and the internal linear momentum always to zero. The latter requirement implies that the origin of the frame be located at the (rigid body) center of mass.

8.2.1 Preliminaries

The translational and rotational equation of motion for any discrete body i are given by:

$$F_i = m_i a_i \tag{8-1}$$

$$T_i = \overset{\circ}{H}_i \tag{8-2}$$

where F_i and T_i are, respectively, the force and the torque exerted on body i; m_i is the mass of body i, a_i the inertial acceleration of the center of mass (CM) of body i, and H_i the angular momentum of body i referred to its CM. The small circle (o) indicates time differentiation with respect to inertial space.

The following equations are of use in the ensuing development of the equations of motion for the bodies of the beam. By the definition of the CM of the beam

$$\sum_{i=1}^{2n} m_i r_i = 0 \qquad (8-3)$$

and by the translational equation of motion of the beam

$$\ddot{\rho}_o = \frac{F_e}{M_T} \qquad (8-4)$$

where the total external force is given by

$$F_e = \sum_{i=1}^{2n} F_{e_i} \qquad (8-5)$$

and the total mass of the beam is given by

$$M_T = \sum_{i=1}^{2n} m_i \qquad (8-6)$$

The rotational equation of motion of the beam is given by:

$$J^* \mathring{\omega}_o = T_e \tag{8-7}$$

where the total external force is given by

$$T_e = \sum_{i=1}^{2n} T_{e_i} \tag{8-8}$$

and J^* is the inertia matrix about the CM of the beam. Since the beam is deformable, J^* is not a constant.

Equations (8-4) and (8-7) define the linear and angular accelerations of the Tisserand frame with respect to which all measurements are made.

8.2.2 Constraint Forces and Constraint Torques

Since the beam is modeled as elastically interconnected discrete rigid bodies, there exist constraint forces and constraint torques that are impressed on the discrete bodies due to the deformations of interconnected bodies. To derive the expressions for these forces and torques, the interconnection of a typical discrete body i with bodies i+2 and i+1 is illustrated respectively in Figures 8-3 and 8-4.

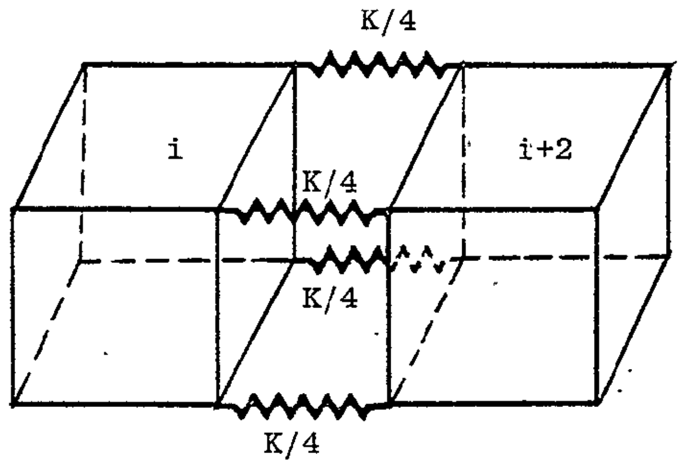

FIGURE 8-3 CONNECTION OF BODIES i AND i+2

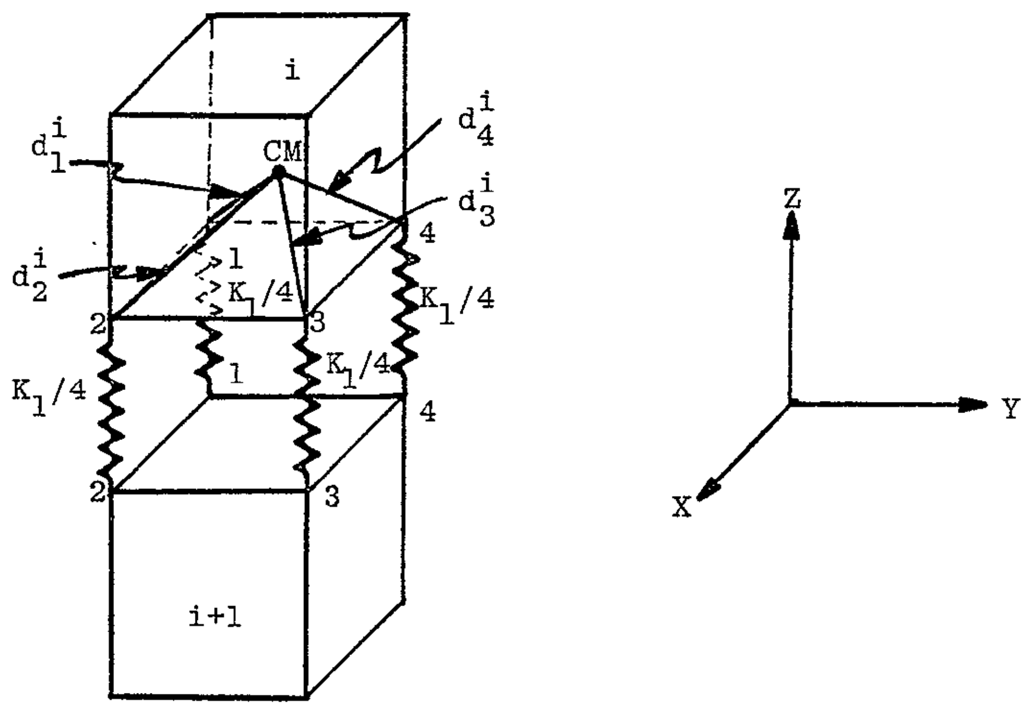

FIGURE 8-4 CONNECTION OF BODIES i AND i+1

Body i is connected to body i+2 (or i-2) via four springs, each with a translational spring constant $\frac{1}{4}K$ and a rotational spring constant $\frac{1}{4}K_\theta$. Similarly, it is connected to body i+1 via four springs each with translational and rotational spring constants $\frac{1}{4}K_1$ and $\frac{1}{4}K_{\theta_1}$.

Let d_j^i denote the vector from the CM of body i to the vertex j of body i. Then the constraint force that is exerted on body i due to body i+1 can be written as

$$F_{c_{i,\,i+1}} = \sum_{j=1}^{4} \frac{1}{4}K_1 (\mu_{i+1} - \mu_i) + \sum_{j=1}^{4} \frac{1}{4}K_1 (\beta_{i+1} \times d_j^{i+1} - \beta_i \times d_j^i) \quad (8\text{-}9)$$

Since

$$\sum_{j=1}^{4} d_j^i = 4d_{i,\,i+1},$$

$$\sum_{j=1}^{4} d_j^{i+1} = 4d_{i+1,\,i} \quad (8\text{-}10)$$

$$d_{i,\,i+1} = -d_{i+1,\,i}$$

and with the skew symmetric matrix A defined by

$$\tilde{A} = \begin{bmatrix} 0 & -A_z & A_y \\ A_z & 0 & -A_x \\ -A_y & A_x & 0 \end{bmatrix} \tag{8-11}$$

where A_x, A_y, A_z are the x, y, z components of the vector A, equation (8-9) simplifies to

$$F_{c_{i,i+1}} = K_1(\dot{\mu}_{i+1} - \dot{\mu}_i) + K_1\tilde{d}_{i,i+1}(\dot{\beta}_{i+1} + \dot{\beta}_i) \tag{8-12}$$

Similarly, the constraint force impressed on body i+1 due to body i is given by (8-13)

$$F_{c_{i+1,i}} = K_1(\dot{\mu}_i - \dot{\mu}_{i+1}) + K_1\tilde{d}_{i+1,i}(\dot{\beta}_i + \dot{\beta}_{i+1})$$

In a similar manner, the constraint forces between bodies i and i+2 can be obtained to be

$$F_{c_{i,i+2}} = K(\mu_{i+2} - \mu_i) + K\tilde{d}_{i,i+2}(\beta_{i+2} + \beta_i) \qquad (8-14)$$

$$F_{c_{i+2,i}} = K(\mu_i - \mu_{i+2}) + K\, d_{i+2,i}(\beta_i + \beta_{i+2}) \qquad (8-15)$$

It can be seen from the above equations that

$$F_{c_{ij}} = F_{c_{ji}}$$

The constraint torque that is experienced by body i due to body i+1 can be written as

$$M_{c_{i,i+1}} = \sum_{j=1}^{4} d_j^i \times \frac{1}{4} K_1 (\mu_{i+1} - \mu_i) + \qquad (8-16)$$

$$\sum_{j=1}^{4} d_j^i \times \frac{1}{4} K_1 \left(\beta_{i+1} \times d_j^{i+1} - \beta_i \times d_j^i\right)$$

With d^i_{oj} as the vector in the xy plane of the body i from the center of elasticity of the four springs connecting bodies i and i+1 (the center is the point of meeting of the vectors $d_{i,i+1}$ and $d_{i+1,i}$) to the j^{th} spring, equation (8-16) using (8-10) can be written as

$$
\begin{aligned}
M_{c_{i,i+1}} = {} & \tilde{d}_{i,i+1} K_1 (\mu_{i+1} - \mu_i) + \sum_{j=1}^{4} \left[\tfrac{1}{4} (d_{i,i+1} + d^i_{oj}) \times \right. \\
& \left. K_1 (d_{i,i+1} + d^i_{oj})^{\sim} \right] \beta_i - \sum_{j=1}^{4} \left[\tfrac{1}{4} (d_{i,i+1} + d^i_{oj}) \times \right. \\
& \left. K_1 (d_{i+1,i} + d^{i+1}_{oj})^{\sim} \right] \beta_{i+1} \qquad (8\text{-}17)
\end{aligned}
$$

The coefficient of β_i in equation (8-17) the term in brackets, simplifies to (noting that $d^i_{oj} = d^{i+1}_{oj}$)

$$
\tilde{d}_{i,i+1} K_1 \tilde{d}_{i,i+1} - \tfrac{1}{4} \sum_{j=1}^{4} \tilde{d}^i_{oj} \tilde{d}^{i+1}_{oj} K_1
$$

The second term in the above expression may be recognized as the rotational spring constant between bodies i and i+1 and hence is replaced by K_{θ_i}. Thus equation (8-17) can be written as

$$M_{c_{i,i+1}} = \tilde{d}_{i,i+1} K_1 (\mu_{i+1} - \mu_i) + \tilde{d}_{i,i+1} K_1 \tilde{d}_{i,i+1} (\beta_{i+1} + \beta_i) + K_{\theta_1} (\beta_{i+1} - \beta_i) \tag{8-18}$$

Similarly, the constraint torque on body i+1 due to body i is given by

$$M_{c_{i+1,i}} = \tilde{d}_{i+1,i} K_1 (\mu_i - \mu_{i+1}) + \tilde{d}_{i+1,i} K_1 \tilde{d}_{i+1,i} (\beta_i + \beta_{i+1}) + K_{\theta_1} (\beta_i - \beta_{i+1}) \tag{8-19}$$

In a similar way, the constraint torques between bodies i and i+2 may be obtained to be

$$
\begin{aligned}
M_{c_{i,i+2}} = {} & \tilde{d}_{i,i+2} K (\mu_{i+2} - \mu_i) + \\
& \tilde{d}_{i,i+2} K \tilde{d}_{i,i+2} (\beta_{i+2} + \beta_i) + \\
& K_\theta (\beta_{i+2} - \beta_i)
\end{aligned}
\tag{8-20}
$$

$$
\begin{aligned}
M_{c_{i+2,i}} = {} & d_{i+2,i} K (\mu_i - \mu_{i+2}) + \\
& \tilde{d}_{i+2,i} K \tilde{d}_{i+2,i} (\beta_i + \beta_{i+2}) + \\
& K_\theta (\beta_i - \beta_{i+2})
\end{aligned}
\tag{8-21}
$$

8.2.3 Translational Equations of Motion for the Full Beam

The translational equation for a typical body i can be written, using equation (8-1) and recognizing that the constraint force between the adjacent bodies contributes to the total force impressed on body i, as

$$F_{e_i} + F_{c_{i,i-2}} + F_{c_{i,i+1}} + F_{c_{i,i+2}} = m_i\ddot{\rho}_i$$

$$i = 3,5,\ldots\ldots,2n-3 \tag{8-22}$$

From Figure 8-2, it follows that

$$\rho_i = \rho_o + R_i \tag{8-23}$$

$$R_i = r_i + \mu_i \tag{8-24}$$

$$i = 1,\ 2,\ \ldots,2n$$

Combining (8-23) and (8-24) and differentiating twice in the inertial frame results in

$$\ddot{\rho}_i = \ddot{\rho}_o + \ddot{r}_i + \ddot{\mu}_i \tag{8-25}$$

The terms appearing in the right-hand side of the above equation can be written in terms of body i rigid body coordinates:

$$\ddot{r}_i = \dot{\omega}_o \times r_i + \omega_o \times \omega_o \times r_i \approx \dot{\omega}_o \times r_i.$$

$$\overset{\circ\circ}{\mu}_i=\ddot{\mu}_i+\dot{\omega}_o x\mu_i+2\omega_o x\dot{\mu}_i+\omega_o x\omega_o x\mu_i \approx \ddot{\mu}_i$$

where the dot (•) indicates time differentiation in a reference frame located at the CM of body i. The approximation results due to the assumption that the deformations are small, which entails the deletion of nonlinear terms. Thus, with the above expressions and the equation (8-4), (8-25) becomes (writing the results in body i rigid body coordinates):

$$\overset{\circ\circ}{\rho}_i = \frac{F_e}{M_T} + \dot{\omega}_o \times r_i + \ddot{\mu}_i \tag{8-26}$$

Substituting for $\overset{\circ\circ}{\rho}_i$ from (8-26) and for the constraint forces from section 8.2.2, the translational equation of motion for body i can be obtained as

$$m_i\ddot{\mu}_i+(2K+K_1)\mu_i-K\mu_{i-2}-K_1\mu_{i+1}-K\mu_{i+2}-K_1\tilde{d}_{i,i+1}\beta_i+K\tilde{d}_{i-2,i}\,\beta_{i-2}+$$
$$K_1\,\tilde{d}_{i+1,i}\,\beta_{i+1}+K\,\tilde{d}_{i+2,i}\,\beta_{i+2}=$$
$$F_{e_i}-\frac{m_i}{M_T}\,F_e+m_i\,\tilde{r}_i\,\dot{\omega}_o$$

$$i=3,5,\ldots\ldots,2n-3 \tag{8-27}$$

Similarly, the translational equations of motion for the remaining bodies can be obtained. A summary of the translational equations is given in Appendix F.1.

8.2.4 Rotational Equations of Motion for the Full Beam

Using equation (8-2) and noting that the constraint torques, which include the effect of constraint forces between the adjacent bodies, contribute to the total torque applied to body i (again, a typical body in the top row of the beam model), the rotational equation of motion for body i can be written as

$$T_{e_i} + \gamma_i x F_{e_i} + M_{c_{i,i-2}} + M_{c_{i,i+1}} + M_{c_{i,i+2}} = \overset{o}{H}_i \qquad (8\text{-}28)$$

$$i = 3, 5, \ldots, 2n-3$$

The rate of change of the angular momentum of body i is given by

$$\overset{o}{H}_i = {}_oT_i \dot{H}_i \qquad (8\text{-}29)$$

with

$$\dot{H}_i = J_i \, {}_oT_i^t (\dot{\omega}_o + \ddot{\beta}_i) + J_i \left[{}_oT_i^t (\dot{\omega}_o + \ddot{\beta}_i) x \, {}_oT_i^t (\dot{\omega}_o + \ddot{\beta}_i) \right] \qquad (8\text{-}30)$$

where ${}_oT_i$ is a fixed transformation from the rigid body coordinate frame of body i to that of the inertial (Tisserand) frame. Neglecting nonlinear terms in (8-30) and noting that the transformation matrix can be approximated by the identity matrix, equations (8-29) and (8-30) combine to yield

$$\overset{\circ}{H}_i \approx J_i(\dot{\omega}_o+\ddot{\beta}_i) \tag{8-31}$$

Substituting for the constraint torques from section 3.2, equations (8-28) and (8-31) with the following definitions.

$$K_\psi \triangleq -\tilde{d}_{i,i\pm2} K \tilde{d}_{i,i\pm2} \tag{8-32}$$

$$K_{\psi_1} \triangleq -\tilde{d}_{i,i\pm1} K \tilde{d}_{i,i\pm1} \tag{8-33}$$

for all i such that the subscripts are positive, yield

$$J_i\ddot{\beta}_i+(2K_\Theta+K_{\Theta_1})\beta_i-K_\Theta\beta_{i-2}-K_{\Theta_1}\beta_{i+1}-K_\Theta\beta_{i+2}$$

$$+(2K_\psi+K_{\psi_1})\beta_i+K_\psi\beta_{i-2}+K_{\psi_1}\beta_{i+1}+K_\psi\beta_{i+2}$$

$$+\tilde{d}_{i,i+1}K_1\mu_i-\tilde{d}_{i,i-2}K\mu_{i-2}-\tilde{d}_{i,i+1}K_1\mu_{i+1}-\tilde{d}_{i,i+2}K\mu_{i+2}$$

$$= T_{e_i} + \gamma_i F_{e_i} - J_i \dot{\omega}_o \tag{8-34}$$

$i=3,5,\ldots\ldots,2n-3$

The rotational equations for bodies i=4,6,.....,2n-4 can be written in a similar manner. To illustrate the nature of equations for the end bodies (i=1,2,2n-1,2n), the rotational equation of motion for body i is given:

$$
\begin{aligned}
& J_1\ddot{\beta}_1+(K_\Theta+K_{\Theta_1})\beta_1-K_{\Theta_1}\beta_2-K_\Theta\beta_3 \\
& \quad +(K_\psi+K_{\psi_1})\beta_1+K_{\psi_1}\beta_2+K_\psi\beta_3 \\
& \quad +(\tilde{d}_{12}K_1+\tilde{d}_{13}K)\mu_1-\tilde{d}_{12}K_1\mu_2-\tilde{d}_{13}K\mu_3 \\
& \quad = T_{e_1}+\gamma_1 F_{e_1}-J_1\dot{\omega}_o
\end{aligned}
\qquad (8\text{-}35)
$$

The rotational equations for i=2, 2n-1 and 2n can be written in a similar manner. A summary of the rotational equations is given in Appendix F.2.

8.2.5 Matrix Equation of Motion for the Full Beam

In the equations of motion developed in the previous two sections, the right-hand sides (rhs) are functions of only external forces and torques, except seemingly for $\dot{\omega}_o$. The rate of change of the inertial rate of the rigid body frame of the beam, $\dot{\omega}_o$, may be defined as the product of the inverse of the inertia dyadic of the discrete bodies about the CM of the beam and the total external torque impressed on the beam; i.e.,

$$\dot{\omega}_o = J_o^{-1} T_o \tag{8-36}$$

where:

$$J_o = \sum_{i=1}^{2n} (J_i - m_i \tilde{r}_i \tilde{r}_i) \tag{8-37}$$

and

$$T_o = \sum_{i=1}^{2n} T_{e_i} + \tilde{\gamma}_i F_{e_i} \tag{8-38}$$

With the above definition (8-36), the rhs of the equations of motion is now only a function of external forces and torques.

C-3

The translational and rotational equations of motion of the discrete bodies constituting the beam may be combined into a single matrix equation to facilitate computations:

$$M_O\ddot{Q} + K_O Q = L_O \tag{8-39}$$

where M_O and K_O are, respectively, mass and stiffness matrices of the beam and are $12n \times 12n$, L_O is a 12n-column vector of external forces and torques, and Q is a 12n-column vector that characterizes the flexible beam deformations and is defined by

$$Q^t = \left[\mu_1^t \;\; \beta_1^t \;\; \mu_2^t \;\; \beta_2^t \cdots\cdots\cdots\cdots \mu_{2n}^t \;\;\; \beta_{2n}^t\right]$$

where μ_i's and β_i's are 3-row vectors and the superscript t denotes the transpose of the matrix or vector.

The beam model that is used in the computer simulation consists of 20(n=10) identical bodies so that

$$m_i = m$$
$$J_i = J$$

for i=1,2,...,2n. Using the equations of motion developed in sections 8.2.3 and 8.2.4, the mass and stiffness matrices M_O and K_O can be defined as follows:

Mass Matrix $M_o = [m_{ij}]$

m_{ij} : 3x3 matrix

0 : 3x3 null matrix

$$m_{ij} = \begin{cases} m & i=j=1,3,\ldots\ldots, 4n-1 \\ J & i=j=2,4,\ldots\ldots, 4n \\ o & i \neq j \end{cases}$$

Stiffness Matrix $K_o = [K_{ij}]$

K_{ij} : 3 x 3 matrix

0 : 3 x 3 null matrix

$$K_{ij} = \begin{cases} K+K_1 & i=j=1,3,4n-3,4n-1 \\ K_\theta+K_{\theta_1}+K_\psi+K_{\psi_1} & i=j=2,4,4n-2,4n \\ 2K+K_1 & i=j=5,7.\ldots.,4n-5 \\ 2K_\theta+K_{\theta_1}+2K_\psi+K_{\psi_1} & i=j=6,8\ldots\ldots,4n-4 \end{cases}$$

$$K_{ij}=K_{ji}^t = \begin{cases} -K & (i,j)=(1,5),(3,7),\ldots.,(4n-5,4n-1) \\ -K_1 & (i,j)=(1,3),(5,7),\ldots.,(4n-3,4n-1) \\ K_\psi-K_\theta & (i,j)=(2,6),(4,8),\ldots.,(4n-4,4n) \\ K_{\psi_1}-K_{\theta_1} & (i,j)=(2,4),(6,8),\ldots.,(4n-2,4n) \end{cases}$$

$$K_{ij}=K_{ji}^t = \begin{cases} -K_\phi & (i,j)=(1,6),(3,8),\ldots.,(4n-5,4n) \\ -K_{\phi_1} & (i,j)=(1,4),(5,8),\ldots.,(4n-3,4n) \\ -K_\phi & (i,j)=(2,5),(4,7),\ldots.,(4n-4,4n-1) \\ -K_{\phi_1} & (i,j)=(2,3),(6,7),\ldots.,(4n-2,4n-1) \\ -K_{\phi_1} & (i,j)=(5,6),(9,10),\ldots,(4n-7,4n-6) \\ +K_{\phi_1} & (i,j)=(7,8),(11,12),\ldots,(4n-5,4n-4) \end{cases}$$

$$
K_{ij}=K^t_{ji} = \begin{cases} -K_\phi - K_{\phi_1} & (i,j)=(\overline{1},\overline{2}) \\ -K_\phi + K_{\phi_1} & (i,j)=(3,4) \\ K_\phi - K_{\phi_1} & (i,j)=(4n-3,4n-2) \\ K_\phi + K_{\phi_1} & (i,j)=(4n-1,4n) \end{cases}
$$

$K_{ij} = 0$ otherwise.

The following definitions have been used in the above characterization of the matrix K_o:

$$K_{\phi_1} \triangleq \tilde{d}_{i,i+1} \; K_1$$

$$K_\phi \triangleq \tilde{d}_{i,i+2} K$$

$$K_{\psi_1} \triangleq K_{\phi_1} \tilde{d}_{i,i+1}$$

$$K_\psi \triangleq K_\phi \tilde{d}_{i,i+2}$$

Also note that

$$d_{ij} = -d_{ji}$$

and

$$d_{i,i+2} = -d_{i,i-2}$$

8.2.6 Split Beam - Interface Forces and Torques

The beam is divided into two halves so that each half of the beam may be modeled to be composed of n(=10) elastically interconnected discrete rigid bodies. The two halves of the beam are put together, as shown in Figure 8-5, by connecting the discrete bodies n-1 and n+1 and the bodies n and n+2. The beam thus connected is referred to as the 'split beam'. Since the two halves are modeled in a manner similar to that of the full beam, the free-free modes of the half-beams can be determined in a similar way as the full beam. Then the free-free modes of the split-beam can be obtained from the free-free modes of the half-beams and the forces and torques acting at the connection points of the half-beams. For computational simplicity, the above two steps can be combined to accomplish the same goal; namely, obtaining the free-free modes of the split-beam from the equations of motion of the 2n discrete bodies that compose the split-beam, keeping in mind that it is the interface forces and torques, not the constraint forces and torques, that act at connection points.

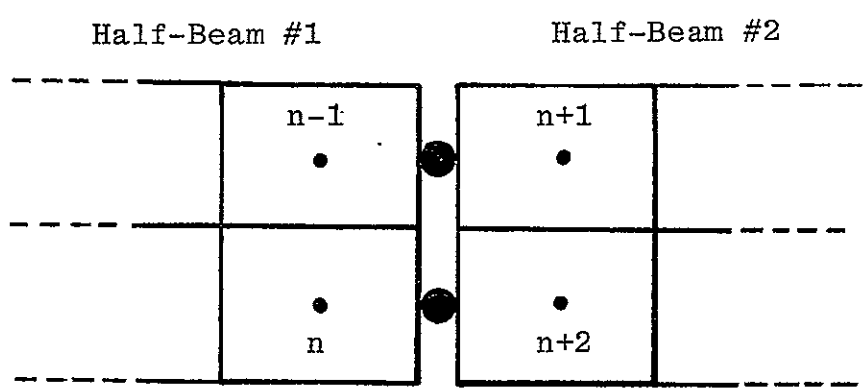

FIGURE 8-5 CONNECTION OF THE HALF-BEAMS

The equations of motion for the discrete bodies not involved in connections can be derived in an identical manner as for those of the full-beam. In order to derive the equations of motion for the bodies involved in the connections of the half-beams, it is first necessary to determine the interface forces and torques acting at each connection point.

The interface force at the connection point between bodies n and n+2 is determined by writing the translational equations of the bodies n and n+2:

$$F_{e_n} + F_{c_{n,n-1}} + F_{c_{n,n-2}} + F_{n,n+2} = m\ddot{\rho}_n \tag{8-40}$$

$$F_{e_{n+2}} + F_{c_{n+2,n+1}} + F_{c_{n+2,n+4}} + F_{n+2,n} = m\ddot{\rho}_{n+2} \tag{8-41}$$

where F_{ij} denotes the interface force at the connection point between bodies i and j. The bodies n and n+2 are connected such that they move as a rigid body so that $F_{n,n+2} = F_{n+2,n}$. Hence, the translational equation for this composite body can be written as

$$F_{e_n} + F_{e_{n+2}} + F_{c_{n,n-1}} + F_{c_{n,n-2}} + F_{c_{n+2,n+1}} + F_{c_{n+2,n+4}} = 2m\,\ddot{\rho}_{n,n+2} \tag{8-42}$$

where $\rho_{n,n+2}$ is the vector from the inertial point to the connection point. Further,

$$\rho_n = \rho_{n,n+2} + \varepsilon_n \tag{8-43}$$

$$\rho_{n+2} = \rho_{n,n+2} + \varepsilon_{n+2} \tag{8-44}$$

From equations (8-40), (8-42) and (8-43), and noting that (neglecting nonlinear terms)

$$\ddot{\varepsilon}_n = (\dot{\omega}_{o1} + \ddot{\beta}_n) \times \varepsilon_n$$

where ω_{o1} is the inertial rate of the rigid body frame of the half-beam #1, the interface force can be solved to be

$$F_{n,n+2} = -m\tilde{\varepsilon}_n\ddot{\beta}_n - m\tilde{\varepsilon}_n\dot{\omega}_{o1} + \frac{1}{2}\left\{F_{c_{n+2,n+4}} + F_{c_{n+2,n+1}} - F_{c_{n,n-1}} - F_{c_{n,n-2}}\right\} + \frac{1}{2}\left(F_{e_{n+2}} - F_{e_n}\right) \qquad (8\text{-}45)$$

Using equations (8.41), (8-42) and (8-44),

$$F_{n+2,n} = -m\tilde{\varepsilon}_{n+2}\ddot{\beta}_{n+2} + \frac{1}{2}\left\{F_{c_{n,n-2}} + F_{c_{n,n-1}} + F_{c_{n+2,n+1}} + F_{c_{n+2,n+4}}\right\} - m\tilde{\varepsilon}_{n+2}\dot{\omega}_{o2} + \frac{1}{2}\left(F_{e_n} - F_{e_{n+2}}\right) \qquad (8\text{-}46)$$

where ω_{o2} is the inertial rate of the rigid body frame of half beam #2.

Since the two halves of the beam have the same inertial rate; i.e.,

$$\dot{\omega}_{o1} + \ddot{\beta}_n = \dot{\omega}_{o2} + \ddot{\beta}_{n+2} \qquad (8\text{-}47)$$

and

$\varepsilon_n = -\varepsilon_{n+2}$, it follows from (8-45) and (8-46) that

$$F_{n,n+2} = -F_{n+2,n} \tag{8-48}$$

which is as expected and says that there is no net force acting at the connection point when the split-beam is viewed as a whole.

Similarly, from the translation equations of bodies n-1 and n+1, the interface force at the connection point of these bodies can be obtained to be

$$\begin{aligned} F_{n-1,n+1} = & -m\tilde{\varepsilon}_{n-1}\,\ddot{\beta}_{n-1} + \frac{1}{2}\left[F_{c_{n+1,n+2}} + F_{c_{n+1,n+3}}\right. \\ & \left. -F_{c_{n-1,n}} - F_{c_{n-1,n-3}}\right] \\ & -m\tilde{\varepsilon}_{n-1}\,\dot{\omega}_{o1} + \frac{1}{2}\left[F_{e_{n+1}} - F_{e_{n-1}}\right] \end{aligned} \tag{8-49}$$

$$\begin{aligned} F_{n+1,n-1} = & -m\tilde{\varepsilon}_{n+1}\,\ddot{\beta}_{n+1} + \frac{1}{2}\left[F_{c_{n-1,n-3}} + F_{c_{n-1,n}}\right. \\ & \left. -F_{c_{n+1,n+2}} - F_{c_{n+1,n+3}}\right] + \frac{1}{2}\left[F_{e_{n-1}} - F_{e_{n+1}}\right] \\ & -m\tilde{\varepsilon}_{n+1}\,\dot{\omega}_{o2} \end{aligned} \tag{8-50}$$

and again noting that $\varepsilon_{n-1} = -\varepsilon_{n+1}$ and

$$\dot{\omega}_{o1} + \ddot{\beta}_{n-1} = \dot{\omega}_{o2} + \ddot{\beta}_{n+1} \tag{8-51}$$

it is seen that

$$F_{n-1,n+1} = -F_{n+1,n-1} \tag{8-52}$$

which is as expected.

The interface torque at the connection point between bodies n and n+2 is determined from the rotational equations of the bodies n and n+2:

$$T_{e_n} + {}_1\tilde{\gamma}_n F_{e_n} + M_{c_{n,n+2}} + M_{c_{n,n-1}} + \tilde{d}_{n,n+2} F_{n,n+2} + M_{n,n+2} = \overset{\circ}{H}_n \tag{8-53}$$

$$T_{e_{n+2}} + {}_2\tilde{\gamma}_{n+2} F_{e_{n+2}} + M_{c_{n+2,n+4}} + M_{c_{n+2,n+1}} + \tilde{d}_{n+2,n} F_{n+2,n} + M_{n+2,n} = \overset{\circ}{H}_{n+2} \tag{8-54}$$

Since the net torque at the connection point should be zero it follows that

$$M_{n,n+2} = -M_{n+2,n} \tag{8-55}$$

Using (8-55) in (8-53) and (8-54) results in the interface torque

$$M_{n,n+2} = \frac{1}{2}\left[M_{c_{n+2,n+4}} + M_{c_{n+2,n+1}} - M_{c_{n,n-1}} - M_{c_{n,n-2}}\right] - \frac{1}{2}\, T_{e_{n,n+2}} \tag{8-56}$$

where $T_{e_{n,n+2}}$ denotes the total external torque on bodies n and n+2. Use is made of the facts that

$$F_{n,n+2} = -F_{n+2,n} \qquad \text{(equation(8-48))}$$

$$d_{n,n+2} = -d_{n+2,n}$$

that thé inertial rates of the bodies n and n+2 are the same

$$\ddot{\beta}_n + \dot{\omega}_{o1} = \ddot{\beta}_{n+2} + \dot{\omega}_{o2}$$

and that the inertia about the CM of bodies n and n+2 is the same; i.e.,

$$J_n = J_{n+2}$$

Similarly, the interface torque at the connection point of bodies n-1 and n+1 may be determined to be

$$M_{n-1,n+1} = \frac{1}{2}\left[M_{c_{n+1,n+3}} + M_{c_{n+1,n+2}} - M_{c_{n-1,n}} - M_{c_{n-1,n-3}}\right] - \frac{1}{2} T_{e_{n-1,n+1}} \qquad (8\text{-}57)$$

where $T_{e_{n-1,n+1}}$ is the total external torque on bodies n-1 and n+1. Again, the interface torques are such that

$$M_{n-1,n+1} = -M_{n+1,n-1} \qquad (8\text{-}58)$$

8.2.7 Translational Equations For Bodies of the Split-Beam

The translational equation for a body i which is not involved in connections may be written, as before, as

$$F_{e_i} + F_{c_{i,i-2}} + F_{c_{i,i+1}} + F_{c_{i,i+2}} = m_i \ddot{\rho}_i$$

$$i \in I_1, I_3 \qquad (8\text{-}59)$$

$$F_{e_i} + F_{c_{i,i-2}} + F_{c_{i,i-1}} + F_{c_{i,i+2}} = m_i \ddot{\rho}_i \qquad i \in I_2, I_4 \tag{8-60}$$

where the indicator functions are defined as

$$I_1 = \{3,5,\ldots,n-3\}$$
$$I_2 = \{4,6,\ldots,n-2\}$$
$$I_3 = \{n+3,n+5,\ldots,2n-3\}$$
$$I_4 = \{n+4,n+6,\ldots,2n-2\}$$

From Figure 8-2, it follows that

$$\rho_i = {}_\ell\rho_o + {}_\ell r_i + \mu_i \tag{8-61}$$

where the preceding subscript ℓ can be either 1 or 2 which, respectively, refer to half-beams #1 or 2; and ${}_\ell r_i$ is the vector from the CM of half-beam #ℓ to the CM of body i in that half-beam. Differentiating (8-61) twice and retaining only the first-order terms in deformations, results in

$$\ddot{\rho}_i = {}_\ell\ddot{\rho}_o + \dot{\omega}_{o\ell} \times {}_\ell r_i + \ddot{\mu}_i \tag{8-62}$$

For half-beam #ℓ

$${}_\ell\ddot{\rho}_o = \frac{{}_\ell F_e}{M_{T_\ell}} \tag{8-63}$$

where ${}_\ell F_e$ and M_{T_ℓ} are, respectively, the total external force applied on the half-beam #ℓ and the total mass of the half-beam #ℓ . Substituting equations (8-62) and

(8-63) in (8-59) and (8-60) results in the translational equations of motion for bodies not involved in connections. For example, the translational equation for bodies which are in the top row of the split-beam and are not involved in connection of the half-beams is given by

$$m_i\ddot{\mu}_i + (2K+K_1)\mu_i - K\mu_{i-2} - K_1\mu_{i+1} - K\mu_{i+2} - K_1\tilde{d}_{i,i+1}\beta_i$$
$$+ K\tilde{d}_{i-2,i}\beta_{i-2} + K_1\tilde{d}_{i+1,i}\beta_{i+1} + K\tilde{d}_{i+2,i}\beta_{i+2}$$
$$= F_{e_i} - \frac{m_i}{M_{T_\ell}} F_{e_\ell} + m_i \, {}_\ell\tilde{r}_i \, \dot{\omega}_{o\ell} \qquad (8\text{-}64)$$

$$\ell = 1 \text{ for } i \in I_1$$
$$\ell = 2 \text{ for } i \in I_3$$

Comparing (8-64) with (8-27) it can be seen that in general, the left-hand sides of the translational equations of the bodies (not involved in connections) of the split-beam are identical to that of the corresponding bodies of the full-beam. Further, it may be noted that the right-hand side (rhs) of (8-64) is an appropriately modified form of the rhs of (8-27).

The translational equations of motion for the four bodies involved in the connection of the half-beams are as follows:

$$m\ddot{\mu}_{n-1} - F_{c_{n-1,n}} - F_{c_{n-1,n-3}} - F_{n-1,n+1} = F_{e_{n-1}} - \frac{m_{n-1}}{M_{T_1}} \, {}_1F_e +$$
$$m_{n-1} \, {}_1\tilde{r}_{n-1}\dot{\omega}_{o1}$$

$$m\ddot{\mu}_n - F_{c_{n,n-1}} - F_{c_{n,n-2}} - F_{n,n+2} = F_{e_n} - \frac{m_n}{M_{T_1}}\ {}_1F_e + m_n\ {}_1\tilde{r}_n\ \dot{\omega}_{o1} \qquad (8\text{-}65)$$

$$m\ddot{\mu}_{n+1} - F_{c_{n+1,n+2}} - F_{c_{n+1,n+3}} - F_{n+1,n-1} = F_{e_{n+1}} - \frac{m_{n+1}}{M_{T_2}}\ {}_2F_e + m_{n+1}\ {}_2\tilde{r}_{n+1}\dot{\omega}_{o2}$$

$$m\ddot{\mu}_{n+2} - F_{c_{n+2,n+1}} - F_{c_{n+2,n+4}} - F_{n+2,n} = F_{e_{n+2}} - \frac{m_{n+2}}{M_{T_2}}\ {}_2F_e + m_{n+2}\ {}_2\tilde{r}_{n+2}\ \dot{\omega}_{o2}$$

Substituting into (8-65) for the constraint forces from section 8.2.2 and for the interface forces from section 8.2.6 results in the translational equations of motion for the bodies involved in connections. These equations are given in Appendix F.3.

8.2.8 Rotational Equations For Bodies of the Split-Beam

The rotational equation of motion for the bodies not involved in connections of the half-beams may be written, as in Section 8.2.4, as

$$T_{e_i} + {}_\ell\gamma_i x F_{e_i} + M_{c_{i,i-2}} + M_{c_{i,i+1}} + M_{c_{i,i+2}} = \overset{\circ}{H}_i \qquad (8\text{-}66)$$

$$\ell = 1 \text{ for } i \in I_1$$

$$\ell = 2 \text{ for } i \in I_3$$

$$T_{e_i}+{}_\ell\gamma_i x F_{ei}+M_{c_{i,i-2}}+M_{c_{i,i-1}}+M_{c_{i,i+2}} = \overset{o}{H}_i \qquad (8\text{-}67)$$

$$\ell = 1 \text{ for } i \in I_2$$
$$\ell = 2 \text{ for } i \in I_4$$

As in Section 8.2.4, the rate of change of the angular momentum of body i may be obtained to be

$$\overset{o}{H}_i = \begin{cases} J_i\ (\dot{\omega}_{o1}+\ddot{\beta}_i) & i \in I_1, I_2 \\ J_i\ (\dot{\omega}_{o2}+\ddot{\beta}_i) & i \in I_3, I_4 \end{cases} \qquad (8\text{-}68)$$

Substituting for constraint torques from Section 8.2.2, equations (8-66) and (8-67) with the aid of (8-68) yield the rotational equations of motion for bodies not involved in connection. For example, for bodies in the top row of the beam, $J_i\ \ddot{\beta}_i + (2K_\theta+K_{\theta_1})\ \beta_i-K_\theta\beta_{i-2}-K_{\theta_1}\beta_{i+1}-K_\theta\beta_{i+2}$

$$+(2K_\psi\ +K_{\psi_1})\ \beta_i+K_\psi\beta_{i-2}+K_{\psi_1}\beta_{i+1}+K_\psi\beta_{i+2}$$

$$+K_{\phi_1}\mu_i+K_\phi\mu_{i-2}-K_{\phi_1}\mu_{i+1}-K_\phi\mu_{i+2}$$

$$= T_{e_i}+{}_1\tilde{\gamma}_i F_{e_i}-J_i\dot{\omega}_o \qquad (8\text{-}69)$$

$$\ell = 1 \text{ for } i \in I_1$$
$$\ell = 2 \text{ for } i \in I_2$$

Comparing (8-69) with (8-34), it is again seen that the left-hand sides of the rotational equations of the bodies (not involved in connections) of the split-beam are identical to that of the corresponding bodies of the full-beam. Further, the right-hand side of (8-69) is an appropriately modified form of the rhs of (8-34).

The rotational equations for bodies involved in the connection of half-beams may be written as

$$T_{e_{n-1}}+{}_1\tilde{\gamma}_{n-1}F_{e_{n-1}}+M_{c_{n-1,n}}+M_{c_{n-1,n-3}}+\tilde{d}_{n-1,n+1}F_{n-1,n+1}$$

$$+M_{n-1,n+1} = J_{n-1}(\dot{\omega}_{o1}+\ddot{\beta}_{n-1}) \tag{8-70}$$

$$T_{e_{n+2}}+{}_2\tilde{\gamma}_{n+2}F_{e_{n+2}}+M_{c_{n+2,n+1}}+M_{c_{n+2,n+4}}+\tilde{d}_{n+2,n}F_{n+2,n}$$

$$+M_{n+2,n} = J_{n+2}(\dot{\omega}_{o2}+\ddot{\beta}_{n+2}) \tag{8-71}$$

The rotational equations for bodies n+1 and n would be identical, respectively, to (8-70) and (8-71) because (i) The expressions for the interface torques have been derived using the rotational equations of bodies n-1 and n+1 and bodies n and n+2, (ii) The inertial rate of the two halves of the beam is the same and hence for the bodies in connection,

$$\dot{\omega}_{o1} + \ddot{\beta}_{n-1} = \dot{\omega}_{o2} + \ddot{\beta}_{n+1} \tag{8-72}$$

$$\dot{\omega}_{o1} + \ddot{\beta}_{n} = \dot{\omega}_{o2} + \ddot{\beta}_{n+2} \tag{8-73}$$

If $\dot{\omega}_{o1} \neq \dot{\omega}_{o2}$, then (8-72) and (8-73) may be utilized as the rotational equations of bodies n + 1 and n, respectively. Substituting for the constraint and interface forces and torques from sections 8.2.2 and 8.2.6 into (8-70) and (8-71) results in the rotational equations of motion for bodies n-1 and n+2. These equations are given in Appendix F.4.

8.2.9 Matrix Equation of Motion for the Split-Beam

If the inertial rates of the rigid body frames of the two half-beams are assumed to be equal, then these inertial rates must equal the inertial rate of the rigid body frame of the original beam. Hence, it is seen again that the rhs of the equations of motion developed in the previous two sections are functions of only external forces and torques.

For the beam under consideration, $J_{o1} = J_{o2}$ and the inertial rates of the half-beams are equal; viz, $\dot{\omega}_{o1} \doteq \dot{\omega}_{o2}$. In such a case (8-72) and (8-73) cannot be used as the rotational equations of bodies n and n+1. Moreover, these equations imply that

$$\beta_{n+1} = \beta_{n-1} \tag{8-74}$$

$$\beta_{n} = \beta_{n+2} \tag{8-75}$$

Thus, β_n and β_{n+1} may be eliminated from the equations of motion. The resultant translational and rotational equations of motion of the bodies composing the split-beam may be combined into the matrix equation

$$M_2\ddot{Q}_2 + K_2Q_2 = L_2 \tag{8-76}$$

where M_2 and K_2 are the mass and stiffness matrices, respectively, of the split-beam and are $(12n-6) \times (12n-6)$. L_2 is a $(12n-6)$ column vector of external forces and torques; and Q_2 is a $(12n-6)$ column vector that characterizes the flexible beam deformations (excluding the angular deformation of bodies n and n+1). and is defined by

$$Q_2^t = \left[\mu_1^t \; \beta_1^t \; \mu_2^t \; \beta_2^t \; \ldots, \mu_{n-1}^t \; \beta_{n-1}^t \; \mu_n^t \; \mu_{n+1}^t \; \mu_{n+2}^t \; \beta_{n+2}^t \; \ldots \mu_{2n}^t \; \beta_{2n}^t\right]$$

Let K_2' be the $12n \times 12n$ stiffness matrix of the split-beam that can be obtained from the equations of motion of the bodies of the split-beam.

Since the left-hand sides of the equations of motion of the bodies which are not involved in the connection of the half-beams are identical to that of the corresponding bodies of the full beam, the rows of the K_2' matrix corresponding to the bodies not involved in connections would be identical to the corresponding rows of the stiffness matrix of the full beam, K_o. So, let K_o' be the $12n \times 12n$ matrix K_o, but with rows $2n-3, 2n-2, \ldots, 2n+4$ which correspond to the equations of motion of the bodies in connection, set to zero. These rows are defined by the elements of a $12n \times 12n$ matrix, K_3, which has all zero entries for rows $1,2,\ldots,2n-4,2n+5,2n+6,\ldots,4n$ which correspond to the equations of motion of bodies not involved in connections and for which the remaining rows are defined by the equations of motion of the bodies in connections. However, the entries in rows $2n$ and $2n+2$

are all equal to zero due to the rotational equations ((8-72) and (8-73)) of the bodies 2n and 2n+2. Once the 12nx12n matrix $K_2' = K_0' + K_3$ is formed, the rows and columns corresponding to β_n and β_{n+1} have to be eliminated keeping in mind that $\beta_n = \beta_{n+2}$ and $\beta_{n+1} = \beta_{n-1}$ (for the case $\dot{\omega}_{o1} = \dot{\omega}_{o2}$). This is accomplished by adding column 2n to column 2n+4 and column 2n+2 to column 2n-2 and then deleting the columns and rows 2n and 2n+2, thus resulting in a (12n-6) x (12n-6) matrix which defines K_2.

The (12n-6) x (12n-6) mass matrix is obtained from the equations of motion developed in sections 8.2.7 8.2.8 and noting the fact that $\beta_n = \beta_{n+2}$ and $\beta_{n+1} = \beta_{n-1}$ which helps eliminate β_n and β_{n+1} and results in the following:

Mass Matrix $M_2 = \left[m_{ij}\right]$ (12n-6)x(12n-6) matrix

m_{ij} : 3x3 matrix
0 : 3x3 null matrix

$$m_{ij} = \begin{cases} m & i=j=1,3,\ldots,4n-3 \\ J & i=j=2,4,\ldots,2n-4,2n+4,2n+6,\ldots,4n-2 \\ J+J^* & i=j=2n-2,2n+2 \\ m & i=j=2n \\ m\tilde{\varepsilon}_{n-1} & (i,j)=(2n-3,2n-2) \\ m\tilde{\varepsilon}_{n+1} & (i,j)=(2n,2n-2) \\ m\tilde{\varepsilon}_{n} & (i,j)=(2n-1,2n+2) \\ m\tilde{\varepsilon}_{n+2} & (i,j)=(2n+1,2n+2) \\ 0 & \text{otherwise} \end{cases}$$

8.2.10 Determination of the Vibration Frequencies and Mode Shapes

The equations of motion for the beam being considered can be written, as pointed out earlier, as:

$$M\ddot{Q} + KQ = L \tag{8-77}$$

To determine the free-free modes of the system represented by (8-77), the external forces and torques on the rhs of (8-77) is set to zero. Thus, (8-77) may be written as:

$$\ddot{Q} + RQ = 0 \tag{8-78}$$

where

$$R = M^{-1}K \tag{8-79}$$

The eigenvalues, which will be real and positive if M and K are mass and stiffness matrices of a stable structural system, of the matrix R represent the square of the (natural) frequencies (in radians) of the modes of vibration which are possible in the system. The eigenvectors of the matrix R corresponding to the eigenvalues computed, characterize the mode shape of the vibration. Thus, if λ_i is an eigenvalue of R and $\bar{X}_i$ is the eigenvector corresponding to λ_i, then $\sqrt{\lambda_i}/2\pi$ is a natural frequency of the system and the components of the vector X_i describe the mode shape of the vibration.

8.2.11 Stiffness Matrices et al

For simulation purposes, a 20'x2'x4' homogeneous beam made of steel is considered. The beam is modelled by the twenty 2 ft. cubes. For the material being considered, the modulus of elasticity, the modulus of rigidity and the density are, respectively, given by

$$E = 29\text{x}10^6 \text{ psi}$$
$$G = 11.5\text{x}10^6 \text{ psi}$$
$$\rho = 0.283 \text{ lbs/in}^3$$

With the coordinate system as defined in Figure 8-6, the following may be defined:

the axial spring constant $K_y = \frac{bc}{a} E$

the shear spring constant $K_x = K_z = \frac{5}{6} \frac{bc}{a} G$

the bending spring constant $\left\{ \begin{array}{l} K_{\theta_x} = \frac{b^3c}{12a} E \\ K_{\theta_z} = \frac{bc^3}{12a} E \end{array} \right.$

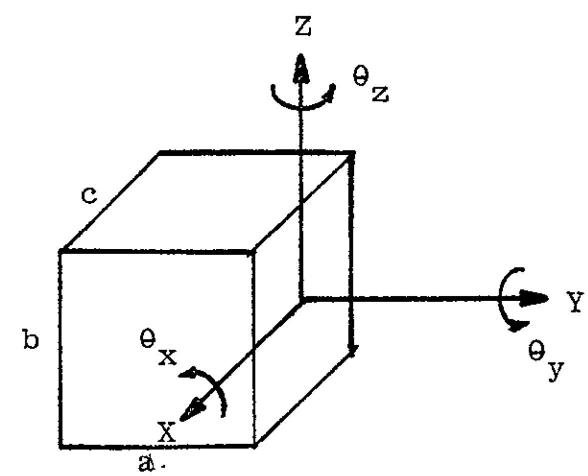

FIGURE 8-6 ILLUSTRATION OF THE COORDINATE SYSTEM

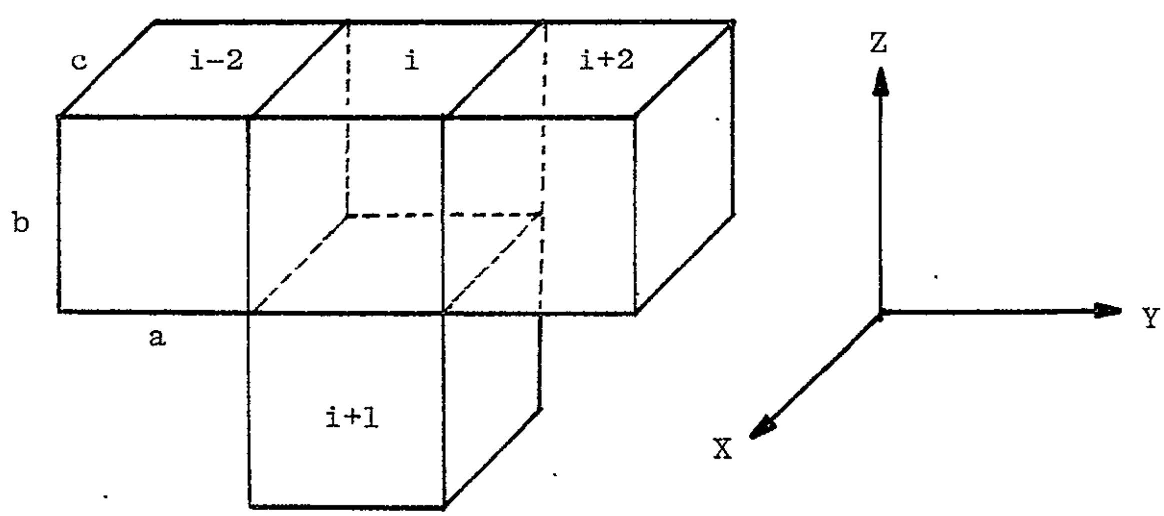

FIGURE 8-7 RELATIONSHIP BETWEEN BODIES

the torsional spring constant $K_{\theta_y} = \frac{J_p}{a} G$

where J_p is the polar moment of inertia and is given by

$$J_p = b^3c \left[1/3 - 0.21 \frac{b}{c}(1 - \frac{b^4}{12c^4})\right]$$

With the above definitions, the stiffness matrices for body i in relation to bodies i-2, i+1, and i+2 (see Figure 8-7) are as follows.

(i) the translational stiffness matrix for bodies i and $i \pm 2$:

$$K = \frac{1}{2} \begin{bmatrix} \frac{5}{6}\frac{bc}{a} G & 0 & 0 \\ 0 & \frac{bc}{a} E & 0 \\ 0 & 0 & \frac{5}{6}\frac{bc}{a} G \end{bmatrix}$$

(ii) the translational stiffness matrix for bodies i and i+1:

$$K_1 = \frac{1}{2} \begin{bmatrix} \frac{5}{6}\frac{bc}{a} G & 0 & 0 \\ 0 & \frac{5}{6}\frac{bc}{a} G & 0 \\ 0 & 0 & \frac{bc}{a} E \end{bmatrix}$$

(iii) the rotational stiffness matrix for bodies i and i$\pm$2:

$$K_\theta = \frac{1}{2}\begin{bmatrix} \frac{b^3c}{12a}E & 0 & 0 \\ 0 & \frac{J_p}{a}G & 0 \\ 0 & 0 & \frac{bc^3}{12a}E \end{bmatrix}$$

(iv) the rotational stiffness matrix for bodies i and i+1:

$$K_{\theta_1} = \frac{1}{2}\begin{bmatrix} \frac{a^3c}{12b}E & 0 & 0 \\ 0 & \frac{ac^3}{12b}E & 0 \\ 0 & 0 & \frac{J_{pp}}{a}G \end{bmatrix}$$

where $J_{pp} = a^3c\left[1/3 - 0.21\,\frac{a}{c}\,(1-\frac{a^4}{12b^4})\right]$

The factor of one-half arises in the above definitions due to the fact that the spring rates of the adjacent bodies are in series.

The mass of each discrete body composing the beam can be computed from

$$m = \rho\, v/g$$

where v is the volume of each body and g is the gravitational acceleration.

The moment of inertia of a body about its CM is given by:

$$J = \int (\delta^T \delta I - \delta \delta^T) dm$$

where δ is the vector from the CM of the body to an elemental mass dm and is given by

$$\delta^T = (ix, jy, kz)$$

and the elemental mass is given by

$$dm = \rho \, dx \, dy \, dz/g$$

For a body of a x b x c

$$J = \int_{-b/2}^{b/2} \int_{-a/2}^{a/2} \int_{-c/2}^{c/2} (\delta^T \delta I - \delta \delta^T) \frac{\rho}{g} \, dx \, dy \, dz$$

Carrying out the integration results in the inertia dyadic

$$J = \frac{m}{12} \begin{bmatrix} a^2+b^2 & 0 & 0 \\ 0 & b^2+c^2 & 0 \\ 0 & 0 & c^2+a^2 \end{bmatrix}$$

The various vectors that are required for the simulation of the equations of motion of the beam are as follows:

(i) the vectors from the CM of the beam to the CM of the body i:

$$r_i = \left(0, -\frac{n-2\left[\frac{i+1}{2}\right] + 1}{2} a, (-1)^{i+1} \frac{b}{2}\right)$$

$$i=1,2,\ldots\ldots,n$$

$$r_{2n-i+1} = -r_i$$

where $\left[\frac{i+1}{2}\right]$ denotes the integer part of $\frac{i+1}{2}$.

(ii) the vectors from the CM of the half-beam #1 to the CM of the body i in the half-beam #1:

$$_1r_i = \left(0, -\left[\frac{\frac{n}{2} - i+1}{2}\right] a, (-1)^{i+1} \frac{b}{2}\right) \qquad i=1,2,\ldots,\frac{n}{2}$$

$$_1r_{n-i+1} = -{_1r_i}$$

$$_1r_j = {_2r_{n+j}} \qquad j=1,2,\ldots,n$$

(iii) the vectors from the CM of body i to the interface point that lies on the line joining the CM of body i and the CM of the adjoining body:

$$d_{i,i+2} = (0, \tfrac{a}{2}, 0) \qquad i=1,2,\ldots.,2n-2$$

$$d_{i,i-2} = (0, -\tfrac{a}{2}, 0) \qquad i=3,4,\ldots.,2n$$

$$d_{i,i+1} = (0, 0, -\tfrac{b}{2}) \qquad i=1,3,\ldots.,2n-1$$

$$d_{i,i-1} = (0, 0, \tfrac{b}{2}) \qquad i=2,4,\ldots.,2n$$

(iv) the vectors from the connection point to the CM of body i:

$$\varepsilon_{n-1} = \varepsilon_n = -\varepsilon_{n+1} = -\varepsilon_{n+2} = (0, -\tfrac{a}{2}, 0)$$

Finally, it may be pointed out that, for the beam example being considered,

$$a = b = c = 2 \text{ ft.}$$

8.2.12 Simulation Results

The eigenvalues and the corresponding eigenvectors are obtained, as discussed in Section 8.2.10, for both the full beam and the split-beam. All the eigenvalues are, as expected, non-negative in both cases.

For the full beam, there are six zero eigenvalues which are associated with the six rigid body modes of the beam. The remaining 114 eigenvalues yield the beam's natural frequencies ranging from 58.2Hz to 2066.8Hz. The eigenvectors corresponding to these 114 eigenvalues, the imaginary parts being zero, are real and hence describe the mode shapes of the vibrations. Due to the truncation and roundoff errors in computations, four of the eigenvalues corresponding to the rigid body modes (instead of being zero) are complex conjugates with the real and imaginary parts being less than 10^{-6} and the other two eigenvalues are real and are less than 10^{-5}. Thus, the computed eigenvectors corresponding to these rigid body modes do not portray the shapes of the rigid body modes.

For the split-beam, there are twelve zero eigenvalues, six of which are associated with the rigid body modes of the beam and the rest of which result due to the way the half-beams are put together. The remaining 102 positive eigenvalues yield natural frequencies ranging from 66.8Hz to 2014.5Hz. Thus, there are twelve frequencies of vibration of the beam which are missing for the split-beam case; otherwise, the frequencies

of vibration of the split-beam compare very favorably with the natural frequencies of the full beam, the maximum error being 14.8%. A comparison chart of the frequencies of vibration obtained for the full beam and the split-beam is shown in Table 8-2.

The mode shapes of the non-zero natural frequencies of the split-beam compare, in general, quite favorably with the corresponding mode shapes obtained for the original beam. Since the angular deformations of two of the four bodies involved in the connection of the half-beams have been eliminated from the equations of motion of the split-beam, the mode shapes corresponding to these deformation coordinates are absent in the eigenvectors of the split-beam. In some cases, the relative amplitudes of vibration of the bodies involved in connections, given by the components (of the eigenvectors) corresponding to the deformation coordinates of the bodies in question, are close to zero. However, it may be pointed out that the corresponding components of the eigenvectors of the original beam are small, generally less than 20% of the maximum component of the eigenvector being considered.

In summary, the lower-order modes (that is, modes corresponding to the frequency range from the lowest to a frequency at least ten times the lowest frequency) of the split-beam compare very well with those of the original beam. The natural frequencies of the beam that are missing from those obtained for the split-beam are all in the high frequency range. Further, there

TABLE 8-2

COMPARISON OF THE FREQUENCIES OF VIBRATION
FOR THE ORIGINAL BEAM AND THE SPLIT-BEAM

ORIGINAL BEAM	SPLIT-BEAM
58.2	66.8
102.4	115.1
125.5	140.6
151.4	153.5
225.6	233.1
249.9	252.7
275.6	305.3
291.9	324.1
363.7	384.6
372.8	409.3
418	429.4
495.4	504.3
495.6	509.6
568.7	622.0
576.7	576.7
617.7	652.7
618.7	667.5
623.2	657.9
719.3	746.5
735.4	756.8
741.7	767.2
780.3	783.2
847.2	*
859.8	917.4
862.3	916.2

TABLE 8-2
CONT'D

ORIGINAL BEAM	SPLIT-BEAM
873.4	929.1
933.1	933.1
934.5	974.9
948.3	951.8
965	984
989.9	1045
991	991
1024.8	1071.6
1037	*
1044.1	*
1054.1	1074.1
1096.9	1096.9
1128.6	1128.6
1131.3	1139.5
1145.4	1157.2
1184.7	1128
1192.3	1192.5
1192.5	1192.6
1199.4	1199.4
1200.4	1202.8
1201.5	1201.9
1205.9	1247.2
1209	1181.4
1229.8	1231.5
1263.7	1219.7
1278.4	1278.4
1289.3	1291.3
1290.8	1294.7

TABLE 8-2
CONT'D

ORIGINAL BEAM	SPLIT-BEAM
1307.9	1317.8
1309.9	1311.3
1316.3	1362.4
1319.6	1319.6
1319.6	*
1319.6	*
1324.9	1344.4
1340.5	*
1341.1	1346.3
1358.8	*
1359	1307.3
1373.1	1374.2
1376.5	*
1387.9	1387.9
1401.3	1399.6
1402.3	1419.8
1409.9	1410.4
1411.9	1427.3
1417.4	1378.8
1431.3	1394.9
1433.4	1408.6
1441.1	1485.7
1461.6	1413.8
1466.3	1492.7
1503.3	*
1509.8	1509.8
1513.2	1515.7
1517.4	1565.1

TABLE 8-2
CONT'D

ORIGINAL BEAM	SPLIT-BEAM
1529.2	*
1530.5	1546.6
1556	1554
1579.3	*
1579.8	1562.9
1600.8	1564.7
1601.3	1601.4
1601.9	1601.2
1611.3	*
1627	1656.3
1635.7	1624.8
1635.9	1636
1656.4	1634.1
1656.5	1623.5
1662.8	*
1663.4	1669.2
1686.9	*
1690.1	1691.5
1713.5	1719.6
1721	*
1723	1657.8
1751.2	1724.5
1759.7	1759.7
1761.6	1761.6
1774.8	1774.8
1786.3	1756.4
1786.9	1752.9
1800.2	1829.2

TABLE 8-2
CONT'D

ORIGINAL BEAM	SPLIT-BEAM
1843.2	1753.6
1866	1850
1944.8	2002.2
2017.5	2014.5
2066.8	*

*Denotes frequencies for which there are no corresponding mode shapes.

are four split-beam's natural frequencies for which there are no corresponding mode shapes in the original beam. However, these are again in the high frequency range. The fact that the higher-order modes of the split-beam do not compare as well as the lower-order modes do with the corresponding modes of the original beam, poses no problem since the control systems associated with spacecraft are, in general, low frequency systems.

The computer outputs showing the natural frequencies and the mode shapes for the original beam and for the split-beam are given in Appendices G and H, respectively.

8.3 CONCLUSIONS

The computer simulation results indicate that the frequencies of vibration and the corresponding mode shapes obtained from the free-free modes of the half-beams and using the method developed for combining the half-beams compare very favorably with those obtained for the original beam using the standard discrete coordinate formulation. The distortions that are encountered in the modes of the split-beam are mostly in the higher-order modes. These distortions are mainly due to the fact that the dynamic model of the split-beam includes, in effect, only 18 bodies whereas the original beam is modeled with 20 bodies. Two of the bodies are "lost" because, for the split-beam, there are only 18 rotational equations and two of the 20 translational equations give rise to six more rigid body modes that are not in the original beam. Thus,

ten percent of the components of the system are, in effect, "lost" when the new modeling technique is utilized for a beam modeled with a small number of bodies. In practice, however, the number of bodies that constitute a spacecraft is large and the number of components involved in connections would be very small thus resulting in a very small percentage of the bodies being "lost" when the modeling technique being considered is used. Thus, in practice, it is expected that the difference between the flexible body characteristics obtained via the new method and the actual flexible body characteristics would be insignificant.

Hence, it can be concluded from the above remarks and the simulation results obtained that the method (reference 8-1) of combining substructures of a system achieves a good degree of fidelity in the determination of flexible body characteristics for the overall system from the characteristics of the substructures constituting the system.

8.4 REFERENCES

8-1 Rybak, S. C., A Method for Determining Overall Flexible Body Characteristics for a Series of Connected Substructures, Rocky Mountain Guidance and Control Conference, March 10-13, 1978, Keystone, Colorado.

8-2 Canavan, J. R. and Likins, P. W., Floating Reference Frames for Flexible Spacecraft, Journal of Spacecraft and Rockets, Vol. 14, No. 12, December 1977, pp 724-732.

SECTION 9

SECTION 9

SECTION 9

9.0 CONCLUSIONS AND RECOMMENDATIONS

Equations have been generated for three different approaches to controlling a large flexible spacecraft. Two of the three (LQR and MNA) were simulated controlling a single axis of the Space Construction Base (SCB), Configuration 1. The third approach, multilevel control, was developed for a three axis SCB simulation; but the computer program was too complex for the actual simulation to be completed before the end of this reporting period.

One control approach utilized some conventional optimization techniques based upon design in the time domain. This approach (LQR) can be easily expanded in dimensions (more axes, actuator locations, flexible modes, etc), readily extended to include noise sources at sensors and actuators, and the filtering of state measurements.

The second control method (MNA), is esentially based upon design in the frequency domain. It utilizes system matrix manipulation to obtain diagonal dominance, thereby reducing the problem to a set of independent single loop designs.

The third control method utilizes a multilevel hierarchal technique which is amenable to implementation by a digital processor. Optimization of the control system is obtained through a performance index using weighting factors on components of the state variable and control vectors.

The other portion of the study was related to mathematical modeling of flexible spacecraft dynamics. The previously generated SCB vehicle equations were derived for large angular displacements of the central body and the appendages (solar wing elements). The model was simplified considerably by restricting motion to small angular displacements. This linearized model was then utilized in single-axis control simulations and the multilevel, three-axis, simulation equations. The three axis linearized equations were also examined with respect to MNA control while including the cross-coupling between axes (the full order mode, FOM). The reduced order model (ROM) was generated to study control of the SCB without cross-coupling, thereby reducing the problem from one larger three-axis analysis to three much simpler single-axis analyses.

A structural analysis study (Section 8) illustrated a technique whereby the structural characteristics of two or more submodules may be combined when the submodules are firmly connected, as through docking or berthing ports. Prediction of the resulting dynamics may be based upon the theory presented. This was verified by means of an example of connecting two shorter beams to obtain one which is longer.

9.1 CONCLUSIONS

The following conclusions are based upon the formulation of control equations and the simulations of Configuration 1 of the Spcae Construction Base:

a. Excellent simulation results were obtained when feeding back the full state variable vector (for LQR, MNA and Retallack pole placement).

b. The results for partial feedback of the state variable vector were satisfactory, but power expended at the central body actuator system was excessive when appendage deflection states were omitted (LQR).

c. The MNA approach also produced good performance for the difficult case of vehicle flexible modes being within the closed loop bandwidth of the attitude control system.

d. The Retallack pole placement method was very successful in placing specific open loop poles in desired positions when the control system loop is closed.

e. The three-dimensional, five-body, linearized vehicle model was transformed into a scalar state variable equation set which was readily programmed for a digital computer.

f. The three-axis, five-body multilevel control method was similarly transformed into an equation set amenable to programming.

g. Cross-axis coupling of the subject vehicle was virtually negligible; that is, differences between the reduced order model (ROM) and the full order

model (FOM) were negligible.

In addition, the structural analysis technique developed in Section 8 was fairly successful in predicting the frequencies of vibration and mode shapes of the "split-beam" structure where the two submodules are fastened end-to-end. This is particularly fortunate since the number of finite elements used was not very high; 20 bodies were used in defining the original full beam and two sets of 10 bodies were used for each of the two connected submodules. Finite element modules for spacecraft in later stages of design usually are defined to a much higher degree; the fidelity of the method described, therefore, is actually expected to be much better when applied to clusters of "real" space vehicle modules.

9.2 RECOMMENDATIONS

The following items are recommended for future studies regarding control of large flexible space vehicles:

a. All three control methods should be expanded to stabilize space vehicles modeled with more discrete elements and dimensions.

b. Similarly, the control should be expanded to stabilize vehicles modeled in three axes, including cross-coupling.

c. More attention must be devoted to quick, accurate generation of spacecraft mathematical models. For vehicles such as Configuration 1 of the SCB, the hybrid coordinate technique is an excellent candidate for this type of study because of the flexible solar wings. Decisions for truncating modes may then be more confidently made on the basis of modal dominance and frequencies.

d. Noise on sensor measurements of states and at actuators may be included in future studies; these are customarily extensions to the LQR method.

e. The MNA and pole placement method should be expanded to placement of closed loop poles with regard to the magnitude of frequency (in addition to damping factor).

f. Control simulations of the LQR and MNA with pole placement methods should be repeated for the X and Y axes of the same vehicle configuration.

g. Because of uncertainties of vehicle model parameters, sensitivity analyses must be included in control system evaluation to determine variations in performance.

h. It may be desirable to try other pole placement techniques (the standard Simon and Mitter technique and the Kalman pole placement algorithm), and evaluate the subsequent designs and performance.

i. A test should be developed for robustness of the control design as a means of simplifying design for future configurations.

j. The three-axis multilevel control simulation should be completed (the SCB Configuration 1 model equations have previously been programmed).

k. When access to measurement of essential state variables is impractical, filtering techniques must be developed for generation of observers required for the inaccessible states.

l. The LQR method should be expanded for stabilization of two or more locations on a large flexible space vehicle; for example, when multiple Instrument Pointing Systems (IPS) are used. There may be a need for stabilization of all six degrees of freedom at the mounting location, particularly when the center of mass of the IPS inner gimbal and payload is not located at each gimbal pivot axis.

It is recommended also, that the structural analysis technique that was developed and evaluated on beams with a limited number of elements, be verified for a high degree of fidelity on more complex structural models with many more finite elements. Further, the problem of substructure model truncation prior to determining the overall system's characteristics should be examined.

APPENDIX A

NUMERICAL VALUES OF MATRICES USED IN ANALYSIS AND DESIGN

- Space Construction Base, Configuration 1

Values of matrices P, N, KD, KS, A, and B used for analysis and control system design purposes are shown on the following pages. A list of constants used in the model is also shown in this Appendix.

Most of the parameter values used in the simulation of five-body three-dimension model of Configuration I are based upon the request issued by Marshall Space Flight Center.

*** P ARRAY (P * (WDOT) = Q) ***
TWO LINES PER A ROW

```
0.3205759E 05 0.0000000E 00 0.4882813E-03 0.4884078E 04 0.1424752E-73 0.0000000E 00 0.4884074E 04 0.0000000E 00
0.0000000E 00 0.1504288E 04 0.0000000E 00 0.0000000E 00 0.1504288E 04 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.2948331E 06 0.0000000E 00 0.0000000E 00 0.4884078E 04 0.0000000E 00 0.0000000E 00 0.4884074E 04
0.0000000E 00 0.0000000E 00 0.1504288E 04 0.0000000E 00 0.0000000E 00 0.1504288E 04 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.2938206E 06-0.2556577E 05 0.0000000E 00 0.0000000E 00 0.2556577E 05 0.0000000E 00
0.0000000E 00 0.2717345E 05 0.2834020E 05 0.0000000E 00 0.7874219E 04 0.0000000E 00 0.0000000E 00

0.4884078E 04 0.0000000E 00-0.2556577E 05 0.5356800E 05 0.0000000E 00 0.0000000E 00 0.9802957E 03 0.0000000E 00
0.0000000E 00 0.1868064E 05 0.0000000E 00 0.0000000E 00 0.3019297E 03 0.0000000E 00 0.0000000E 00

0.3635371E 46 0.4884078E 04 0.0000000E 00 0.0000000E 00 0.5432681E 05 0.0000000E 00 0.0000000E 00 0.9802957E 03
0.0000000E 00 0.0000000E 00 0.1868064E 05 0.0000000E 00 0.0000000E 00 0.3019297E 03 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.7571689E 03 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.4884074E 04 0.0000000E 00 0.2556577E 05 0.9802957E 03 0.0000000E 00 0.0000000E 00 0.5356797E 05 0.0000000E 00
0.0000000E 00 0.3019294E 03 0.0000000E 00 0.0000000E 00 0.1868063E 05 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.4884074E 04 0.0000000E 00 0.0000000E 00 0.9802957E 03 0.0000000E 00 0.0000000E 00 0.5432678E 05
0.0000000E 00 0.0000000E 00 0.3019294E 03 0.0000000E 00 0.0000000E 00 0.1868063E 05 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.7571692E 03 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.1504288E 04 0.0000000E 00 0.2717345E 05 0.1868064E 05 0.0000000E 00 0.0000000E 00 0.3019294E 03 0.0000000E 00
0.0000000E 00 0.1180585E 05 0.0000000E 00 0.0000000E 00 0.9299382E 02 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.1504288E 04 0.2834020E 05 0.0000000E 00 0.1868064E 05 0.0000000E 00 0.0000000E 00 0.3019294E 03
0.0000000E 00 0.0000000E 00 0.1256466E 05 0.0000000E 00 0.0000000E 00 0.9299382E 02 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.7571689E 03 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.1504288E 04 0.0000000E 00 0.7874219E 04 0.3019297E 03 0.0000000E 00 0.0000000E 00 0.1868063E 05 0.0000000E 00
0.0000000E 00 0.9299382E 02 0.0000000E 00 0.0000000E 00 0.1180585E 05 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.1504288E 04 0.0000000E 00 0.0000000E 00 0.3019297E 03 0.0000000E 00 0.0000000E 00 0.1868063E 05
0.0000000E 00 0.0000000E 00 0.9299382E 02 0.0000000E 00 0.0000000E 00 0.1256466E 05 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.7571692E 03
```


P ARRAY

*** N ARRAY *** (W = N* XH1)

1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00

N ARRAY

*** KD DAMPING CONSTANT ARRAY ***
(TWO LINES PER A ROW)

```
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.3621600E 02 0.0000000E 00 0.0000000E 00 0.3621600E 02 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.2677729E 03 0.0000000E 00 0.0000000E 00 0.2677729E 03
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.3587900E 01 0.0000000E 00 0.0000000E 00
0.3587900E 01 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00-0.3621600E 02 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.1550000E 03 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.2677729E 03 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.3148030E 04 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.3587900E 01 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.3203900E 01 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.3621600E 02 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.1550000E 03 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.2677729E 03
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.3148030E 04 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
-0.3587900E 01 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.3203900E 01

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00-0.1550000E 03 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00-0.3148030E 04 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00-0.3203900E 01 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.1550000E 03 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.3148030E 04 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.3203900E 01
```

KD ARRAY

*** KS STIFFNESS MATRIX ***
< TWO LINES PER A ROW >

```
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.1966830E 05 0.0000000E 00 0.0000000E 00 0.1966830E 05 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.5998410E 07 0 0000000E 00 0.0000000E 00 0.5998410E 07
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0 0000000E 00 0.0000000E 00 0.6557200E 03 0.0000000E 00 0.0000000E 00
0.6557200E 03 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00-0.1966830E 05 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.1841400E 04 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.5998410E 07 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.7024030E 06 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.6557200E 03 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.8954900E 02 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.1966830E 05 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.1841400E 04 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.5998410E 07
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.7024030E 06 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
-0.6557200E 03 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.8954900E 02

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00-0.1841400E 04 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00-0.7024030E 06 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00-0.8954900E 02 0.0000000E 00 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.1841400E 04 0.0000000E 00 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.7024030E 06 0.0000000E 00

0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.8954900E 02
```

KS ARRAY

*** A11 PART OF A -THE PLANT MATRIX (ROWS=1,15 ;COLS=1,15) ***
(TWO LINES PER A ROW)

```
 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.1280899E-02 0.0000000E 00-0.5771543E-12 0.1280899E-02 0.0000000E 00
-0.5771543E-12-0.6926712E-03 0.0000000E 00 0.0000000E 00-0.6926707E-03 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.1000111E-02 0.0000000E 00 0.0000000E 00 0.1000111E-02
 0.0000000E 00 0.0000000E 00-0.1348562E-02 0.0000000E 00 0.0000000E 00-0.1348562E-02 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.7501572E-04 0.0000000E 00 0.1336089E-04 0.7501571E-04 0.0000000E 00
 0.1336089E-04 0.4367963E-03 0.0000000E 00 0.0000000E 00-0.4367961E-03 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.2962485E-02 0.0000000E 00 0.7431766E-05-0.1354121E-02 0.0000000E 00
 0.7431766E-05 0.1767937E-01 0.0000000E 00 0.0000000E 00 0.4263467E-03 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.1118445E-01 0.0000000E 00 0.0000000E 00-0.9886064E-03
 0.0000000E 00 0.0000000E 00 0.2963305E 00 0.0000000E 00 0.0000000E 00-0.1739376E-03 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.7501571E-04 0.0000000E 00-0.4751936E-02-0.7501572E-04 0.0000000E 00
-0.1336089E-04-0.4367963E-03 0.0000000E 00 0.4231419E-02 0.4367961E-03 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.1354121E-02 0.0000000E 00-0.7431767E-05-0.2962486E-02 0.0000000E 00
-0.7431767E-05 0.4263471E-03 0.0000000E 00 0.0000000E 00 0.1767937E-01 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.9886064E-03 0.0000000E 00 0.0000000E 00-0.1118445E-01
 0.0000000E 00 0.0000000E 00-0.1739395E-03 0.0000000E 00 0.0000000E 00 0.2963274E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.7501571E-04 0.0000000E 00-0.1336089E-04-0.7501572E-04 0.0000000E 00
-0.4751936E-02-0.4367963E-03 0.0000000E 00 0.0000000E 00 0.4367961E-03 0.0000000E 00 0.4231419E-02

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.4130814E-02 0.0000000E 00-0.1011085E-04 0.9961669E-04 0.0000000E 00
-0.1011085E-04-0.5660854E-01 0.0000000E 00 0.0000000E 00 0.3623310E-03 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.2520601E-01 0.0000000E 00 0.0000000E 00-0.1479540E-04
 0.0000000E 00 0.0000000E 00-0.9839008E 00 0.0000000E 00 0.0000000E 00 0.1957956E-02 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.4738573E-02 0.0000000E 00 0.0000000E 00
 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.8462839E-02 0.0000000E 00 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.9961659E-04 0.0000000E 00 0.1011084E-04 0.4130814E-02 0.0000000E 00
 0.1011084E-04 0.3623313E-03 0.0000000E 00 0.0000000E 00-0.5660854E-01 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.1479524E-04 0.0000000E 00 0.0000000E 00 0.2520575E-01
 0.0000000E 00 0.0000000E 00 0.1957956E-02 0.0000000E 00 0.0000000E 00-0.9838948E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
 0.4738573E-02 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.8462839E-02
```

$$A = \begin{bmatrix} A_{11} & A_{12} \\ I & O \end{bmatrix},$$ A11 PART OF A MATRIX

*** A12 PART OF A -THE PLANT MATRIX (ROWS=1,15 ;COLS=16,30) ***
(TWO LINES PER A ROW)

```
 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.6956348E 00 0.0000000E 00-0.1054800E-09 0.6956348E 00 0.0000000E 00
-0.1054800E-09-0.8228935E-02 0.0000000E 00 0.0000000E 00-0.8228928E-02 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0 2240359E 02 0.0000000E 00 0.0000000E 00 0.2240359E 02
 0.0000000E 00 0.0000000E 00-0.3008974E 00 0.0000000E 00 0.0000000E 00-0.3008974E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.4073977E-01 0.0000000E 00 0.2441819E-02 0.4073976E-01 0.0000000E 00
 0.2441819E-02 0.5189139E-02 0.0000000E 00 0.0000000E 00-0.5189139E-02 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.1608875E 01 0.0000000E 00 0.1358220E-02-0.7354001E 00 0.0000000E 00
 0.1358220E-02 0.2100309E 00 0.0000000E 00 0.0000000E 00 0.5064998E-02 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.2505439E 03 0.0000000E 00 0.0000000E 00-0.2214587E 02
 0.0000000E 00 0.0000000E 00 0.6611862E 02 0.0000000E 00 0.0000000E 00-0.3880975E-01 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.4073977E-01 0.0000000E 00-0.8684571E 00-0.4073976E-01 0.0000000E 00
-0.2441819E-02-0.5189139E-02 0.0000000E 00 0.1182682E 00 0.5189139E-02 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.7354001E 00 0.0000000E 00-0.1358220E-02-0.1608876E 01 0.0000000E 00
-0.1358220E-02 0.5065005E-02 0.0000000E 00 0.0000000E 00 0.2100309E 00 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.2214587E 02 0.0000000E 00 0.0000000E 00-0.2505439E 03
 0.0000000E 00 0.0000000E 00-0.3881019E-01 0.0000000E 00 0.0000000E 00 0.6611795E 02 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.4073977E-01 0.0000000E 00-0.2441819E-02-0.4073976E-01 0.0000000E 00
-0.8684571E 00-0.5189139E-02 0.0000000E 00 0.0000000E 00 0.5189139E-02 0.0000000E 00 0.1182682E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.2243375E 01 0.0000000E 00-0.1847846E-02 0.5410015E-01 0.0000000E 00
-0.1847846E-02-0.6725094E 00 0.0000000E 00 0.0000000E 00 0.4304495E-02 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.5646426E 03 0.0000000E 00 0.0000000E 00-0.3314323E 00
 0.0000000E 00 0.0000000E 00-0.2195325E 03 0.0000000E 00 0.0000000E 00 0.4368683E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.8660153E 00 0.0000000E 00 0.0000000E 00
 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.2365364E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.5410010E-01 0.0000000E 00 0.1847845E-02 0.2243375E 01 0.0000000E 00
 0.1847845E-02 0.4304495E-02 0.0000000E 00 0.0000000E 00-0.6725094E 00 0.0000000E 00 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.3314285E 00 0.0000000E 00 0.0000000E 00 0.5646367E 03
 0.0000000E 00 0.0000000E 00 0.4368683E 00 0.0000000E 00 0.0000000E 00-0.2195312E 03 0.0000000E 00

 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00
 0.8660153E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00 0.0000000E 00-0.2365364E 00
```

A12 PART OF A MATRIX

*** B ARRAY (CONTROL MATRIX) FIRST 15 ROWS ***

0.3208360E-04	0.0000000E 00	-0.1608613E-12	-0.3284731E-05	0.0000000E 00	0.0000000E 00	-0.3284727E-05	0.0000000E 00	0.0000000E 00
0.0000000E 00	0.3401813E-05	0.0000000E 00	0.0000000E 00	-0.3331086E-06	0.0000000E 00	0.0000000E 00	-0.3331086E-06	0.0000000E 00
-0.1608613E-12	0.0000000E 00	0.3723875E-05	0.2071341E-05	0.0000000E 00	0.0000000E 00	-0.2071341E-05	0.0000000E 00	0.0000000E 00
-0.3536833E-04	0.0000000E 00	0.2071341E-05	0.4643211E-04	0.0000000E 00	0.0000000E 00	0.2021786E-05	0.0000000E 00	0.0000000E 00
0.0000000E 00	-0.3734922E-05	0.0000000E 00	0.0000000E 00	0.3803347E-04	0.0000000E 00	0.0000000E 00	-0.4296493E-07	0.0000000E 00
0.1608613E-12	0.0000000E 00	-0.3723875E-05	-0.2071341E-05	0.0000000E 00	0.1320709E-02	0.2071341E-05	0.0000000E 00	0.0000000E 00
-0.3536833E-04	0.0000000E 00	-0.2071341E-05	0.2021789E-05	0.0000000E 00	0.0000000E 00	0.4643212E-04	0.0000000E 00	0.0000000E 00
0.0000000E 00	-0.3734922E-05	0.0000000E 00	0.0000000E 00	-0.4296493E-07	0.0000000E 00	0.0000000E 00	0.3803347E-04	0.0000000E 00
0.1608613E-12	0.0000000E 00	-0.3723875E-05	-0.2071341E-05	0.0000000E 00	0.0000000E 00	0.2071341E-05	0.0000000E 00	0.1320709E-02
0.4468847E-05	0.0000000E 00	-0.2818041E-05	-0.1095916E-03	0.0000000E 00	0.0000000E 00	0.1718220E-05	0.0000000E 00	0.0000000E 00
0.0000000E 00	0.4283829E-06	0.0000000E 00	0.0000000E 00	-0.9370365E-04	0.0000000E 00	0.0000000E 00	0.4836363E-06	0.0000000E 00
0.0000000E 00	0.0000000E 00	0.0000000E 00	0.0000000E 00	0.0000000E 00	-0.1320709E-02	0.0000000E 00	0.0000000E 00	0.0000000E 00
0.4468843E-05	0.0000000E 00	0.2818039E-05	0.1718219E-05	0.0000000E 00	0.0000000E 00	-0.1095916E-03	0.0000000E 00	0.0000000E 00
0.0000000E 00	0.4283829E-06	0.0000000E 00	0.0000000E 00	0.4836357E-06	0.0000000E 00	0.0000000E 00	-0.9370269E-04	0.0000000E 00
0.0000000E 00	0.0000000E 00	0.0000000E 00	0.0000000E 00	0.0000000E 00	0.0000000E 00	0.0000000E 00	0.0000000E 00	-0.1320709E-02

*** ROWS 16 THRU 30 ARE ALL ZEROS ***

B ARRAY

***** SPACE BASE, CONFIGURATION 1(5BODY) *****

CD 1	MSM1	0.5109602E 03	KXSM1	0.5125000E 01	KXSWB	0.2991702E 02
CD 2	MHM1	0.5124204E 03	KYSM1	0.4816702E 01	KYSWB	0.3091702E 02
CD 3	MDM1	0.1748300E 03	KZSM1	0.4816702E 01	KZSWB	0.7566702E 01
CD 4	MTA1	0.2020201E 02	KXSWA	0.2991702E 02	KXTA1	0.3091702E 01
CD 5	MSWA	0.2644902E 02	KYSWA	0.3091702E 02	KYTA1	0.3625000E 01
CD 6	MSWB	0.2644902E 02	KZSWA	0.7566702E 01	KZTA1	0.3625000E 01
CD 7	DTA1	0.8750000E 01	LDM1	0.1080000E 02	LHM1	0.2600000E 02
CD 8	LSM1	0.1100000E 02	LTA1	0.1100000E 02	IXDM1	0.3972300E 04
CD 9	IXHM1	0.1345900E 05	IYDM1	0.3686000E 04	IYHM1	0.3558500E 05
CD 10	IZDM1	0.3686000E 04	IZHM1	0.3558500E 05	WSWA	0.2600000E 02
CD 11	WSWB	0.2600000E 02	XDM1	-0.3141698E 02	YDM1	0.0000000E 00
CD 12	ZDM1	0.0000000E 00	XSWA	0.1650000E 02	YSWA	0.0000000E 00
CD 13	ZSWA	0.5958301E 02	XHM1	-0.1300000E 02	YHM1	0.0000000E 00
CD 14	ZHM1	0.0000000E 00	XSWB	0.1650000E 02	YSWB	0.0000000E 00
CD 15	ZSWB	-0.5958299E 02	XSM1	0.5500000E 01	YSM1	0.0000000E 00
CD 16	ZSM1	0.0000000E 00	XTA1	0.1650000E 02	YTA1	0.0000000E 00
CD 17	ZTA1	0.0000000E 00	KS12X	0.1966830E 05	KS12Y	0.5998410E 07
CD 18	KS12Z	0.6557202E 03	CS12X	0.3621600E 02	CS12Y	0.2677732E 03

MODEL PARAMETERS

CD 19	CS12Z 0.3587900E 01	KS13X 0.1966830E 05	KS13Y 0.5998410E 07
CD 20	KS13Z 0.6557202E 03	CS13X 0.3621600E 02	CS13Y 0.2677732E 03
CD 21	CS13Z 0.3587900E 01	KS24X 0.1841400E 04	KS24Y 0.7024030E 06
CD 22	KS24Z 0.8954901E 02	CS24X 0.1550000E 03	CS24Y 0.3148030E 04
CD 23	CS24Z 0.3203900E 01	KS35X 0.1841400E 04	KS35Y 0.7024030E 06
CD 24	KS35Z 0.8954901E 02	CS35X 0.1550000E 03	CS35Y 0.3148030E 04
CD 25	CS35Z 0.3203900E 01	XLSWA 0.1040000E 03	XLSWB 0.1040000E 03
CD 26	RE1X 0.0000000E 00	RE1Y 0.0000000E 00	RE1Z 0.0000000E 00
CD 27	RA1X 0.0000000E 00	RA1Y 0.0000000E 00	RA1Z 0.0000000E 00
CD 28	RE2X 0.0000000E 00	RE2Y 0.0000000E 00	RE2Z 0.0000000E 00
CD 29	RA2X 0.0000000E 00	RA2Y 0.0000000E 00	RA2Z 0.0000000E 00
CD 30	RE3X 0.0000000E 00	RE3Y 0.0000000E 00	RE3Z 0.0000000E 00
CD 31	RA3X 0.0000000E 00	RA3Y 0.0000000E 00	RA3Z 0.0000000E 00
CD 32	RE4X 0.0000000E 00	RE4Y 0.0000000E 00	RE4Z 0.0000000E 00
CD 33	RA4X 0.0000000E 00	RA4Y 0.0000000E 00	RA4Z 0.0000000E 00
CD 34	RE5X 0.0000000E 00	RE5Y 0.0000000E 00	RE5Z 0.0000000E 00
CD 35	OMG1X 0.0000000E 00	OMG1Y 0.0000000E 00	OMG1Z 0.0000000E 00
CD 36	OMG2X 0.0000000E 00	OMG2Y 0.0000000E 00	OMG2Z 0 0000000E 00
CD 37	OMG3X 0.0000000E 00	OMG3Y 0.0000000E 00	OMG3Z 0.0000000E 00

CD 38	OMG4X 0.0000000E 00	OMG4Y 0.0000000E 00	OMG4Z 0.0000000E 00
CD 39	OMG5X 0.0000000E 00	OMG5Y 0.0000000E 00	OMG5Z 0.0000000E 00
CD 40	DPHI24 0.0000000E 00	DTHT24 0.0000000E 00	DPSI24 0.0000000E 00
CD 41	DPHI35 0.0000000E 00	DTHT35 0.0000000E 00	DPSI35 0.0000000E 00
CD 42	DPHI12 0.0000000E 00	DTHT12 0.0000000E 00	DPSI12 0.0000000E 00
CD 43	DPHI13 0.0000000E 00	DTHT13 0.0000000E 00	DPSI13 0.0000000E 00
CD 44	PHI1 0.0000000E 00	THT1 0.0000000E 00	PSI1 0.2000000E-01
CD 45	RDT1X 0.0000000E 00	RDT1Y 0.0000000E 00	RDT1Z 0.0000000E 00
CD 46	R1X 0.0000000E 00	R1Y 0.0000000E 00	R1Z 0.0000000E 00
CD 47	DT 0.5000000E-01	IPRT 0.2000000E 02	TEND 0.5000000E 02

APPENDIX B

TRANSFER FUNCTIONS FOR SYMMETRIC Z-AXIS WITH STATE VECTOR

$$X^T(t) = \left[\omega_1,\ \omega_{21},\ \omega_{42},\ \psi_{21},\ \Psi_{42}\right]$$

- Space Construction Base, Configuration 1

RUN GOFS

NUMBER OF CONTROLLED STATES ? 5

NUMBER OF CONTROLS AND OUTPUTS ? 2,5

LIST INPUT MATRICES ? <NO> YES

ENTER INPUT MATRICES DATA FILE. *ZAXIS2

LIST CALCULATED NUM. & DENOM. PAIRS ? <NO> YES

NAME OF GENERATED TRANSFER FUNCTION FILE ? *ZZ2

INPUT MATRIX A =

0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.0000E+00	-0.4765E-02	0.4231E-02	-0.8685E+00	0.1183E+00
0.0000E+00	0.4739E-02	-0.8463E-02	0.8660E+00	-0.2365E+00
0.0000E+00	0.1000E+01	0.0000E+00	0.0000E+00	0.0000E+00
0.0000E+00	0.0000E+00	0.1000E+01	0.0000E+00	0.0000E+00

INPUT MATRIX B =

0.3724E-05	0.0000E+00
-0.3724E-05	0.1321E-02
0.0000E+00	-0.1321E-02
0.0000E+00	0.0000E+00
0.0000E+00	0.0000E+00

INPUT MATRIX C =

0.1000E+01	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.0000E+00	0.1000E+01	0.0000E+00	0.0000E+00	0.0000E+00
0.0000E+00	0.0000E+00	0.1000E+01	0.0000E+00	0.0000E+00
0.0000E+00	0.0000E+00	0.0000E+00	0.1000E+01	0.0000E+00
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.1000E+01

****

OUTPUT 1 INPUT 1

*********** NUMERATOR COEFFICIENTS ***********

0.37244E-05 0.00000 0.41150E-05 0.14901E-07
0.38339E-06

*********** DENOMINATOR COEFFICIENTS ***********

0.13228E-01 1.1050 0.42524E-02 0.10295
0.00000

****

OUTPUT 1 INPUT 2

*********** NUMERATOR COEFFICIENTS ***********

0.00000 0.00000 0.00000 0.00000
0.00000

*********** DENOMINATOR COEFFICIENTS ***********

0.13228E-01 1.1050 0.42524E-02 0.10295
0.00000

****

OUTPUT 2 INPUT 1

*********** NUMERATOR COEFFICIENTS ***********

-0.37244E-05-0.29802E-07-0.88073E-06 0.00000
0.00000

*********** DENOMINATOR COEFFICIENTS ***********

0.13228E-01 1.1050 0.42524E-02 0.10295
0.00000

****

ORIGINAL PAGE IS
OF POOR QUALITY

```
          OUTPUT   2       INPUT    2
*********** NUMERATOR COEFFICIENTS ***********
 0.13210E-02 0.55879E-05 0.15614E-03 0.00000
 0.00000
*********** DENOMINATOR COEFFICIENTS ***********
 0.13223E-01  1.1050     0.42524E-02 0.10295
 0.00000

************************************************
          OUTPUT   3       INPUT    1
*********** NUMERATOR COEFFICIENTS ***********
 0.00000     0.00000    -0.32250E-05 0.00000
 0.00000
*********** DENOMINATOR COEFFICIENTS ***********
 0.13228E-01  1.1050     0.42524E-02 0.10295
 0.00000

************************************************
          OUTPUT   3       INPUT    2
*********** NUMERATOR COEFFICIENTS *********
-0.13210E-02-0.59605E-07-0.33026E-05 0.00000
 0.00000
*********** DENOMINATOR COEFFICIENTS ***********
 0.13228E-01  1.1050     0.42524E-02 0.10295
 0.00000

************************************************
          OUTPUT   4       INPUT    1
*********** NUMERATOR COEFFICIENTS ***********
 0.00000    -0.37253E-05-0.31490E-07-0.58073E-06
 0.00000
*********** DENOMINATOR COEFFICIENTS ***********
 0.13228E-01  1.1050     0.42524E-02 0.10295
 0.00000

************************************************
          OUTPUT   4       INPUT    2
*********** NUMERATOR COEFFICIENTS ***********
-0.18626E-08 0.13210E-02 0.55854E-05 0.15614E-03
 0.00000
*********** DENOMINATOR COEFFICIENTS ***********
 0.13228E-01  1.1050     0.42524E-02 0.10295
 0.00000

************************************************
          OUTPUT   5       INPUT    1
*********** NUMERATOR COEFFICIENTS ***********
 0.00000     0.00000    -0.18626E-07-0.32250E-05
 0.00000
*********** DENOMINATOR COEFFICIENTS ***********
 0.13228E-01  1.1050     0.42524E-02 0.10295
 0.00000

************************************************
          OUTPUT   5       INPUT    2
*********** NUMERATOR COEFFICIENTS ***********
 0.00000    -0.13210E-02-0.35623E-07-0.33024E-05
 0.00000
*********** DENOMINATOR COEFFICIENTS **
```

APPENDIX C

DERIVATION AND ANALYSIS OF MINIMUM $(\text{TRACE } E_C^T E_C)^{\frac{1}{2}}$ SOLUTION FOR STATE CONTROLLER GAIN MATRIX C

The problem, minimize $|C\underline{x}_j - \underline{y}_j|^2$ with respect to $\underline{x}$ where $\underline{x}_j$ is the jth column of G and $\underline{y}_j$ is the jth column of $A_p + \frac{1}{T} I$, is equivalent to the problem, minimize $(\text{trace } E_c^T E_c)^{\frac{1}{2}}$ with respect to G where:

$E_c \triangleq A_c + \frac{1}{T} I$

$I \triangleq$ identity matrix of dimension n

Expanding $|C\underline{x}_j - \underline{y}_j|^2$, we have

$\underline{x}_j^T C^T C\underline{x}_j - 2\underline{y}_j C\underline{x}_j + \underline{y}_j^T \underline{y}_j$

Taking the gradient with respect to $\underline{x}_j$, setting equal to zero for a critical value and solving for $\underline{x}_j$, we obtain

$$\underline{x}_j = C^* \underline{y}_j \tag{C-1}$$

where

$$C^* \triangleq (C^T C)^{-1} C^T \tag{C-2}$$

Therefore:

$$G = C^*(A_p + \frac{1}{T} I) \tag{C-3}$$

Substituting equation (C-3) into equation (7-23) yields:

$$\dot{\underline{x}}_p = A_c \underline{x}_p + D\underline{w} \tag{7-22}$$

where:

$$A_c = A_p - CC^*(A_p + \frac{1}{T}I) \qquad \text{(C-4)}$$

It was desired that all of the eigenvalues of the controlled plant matrix, A_c, be $-\frac{1}{T}$. The c linearly independent columns of C, that is, the vectors $C\underline{\delta}_i$; $i = 1$ to c,

where:

$$\underline{\delta}_i = (\delta_{i1}, \delta_{i2}, \ldots\ldots\ldots, \delta_{ic})^T \qquad \text{(C-5)}$$

δ_{ij} = the Kronecker delta

are eigenvalues of A_c^T corresponding to the eigenvalue, $-1/T$; since

$$A_c^T C\underline{\delta}_i = -\frac{1}{T} C\underline{\delta}_i \qquad \text{(C-6)}$$

Therefore, at least c of the eigenvalues of A_c are $-1/T$ since the number of linearly independent eigenvectors corresponding to a given eigenvalue is not greater than the multiplicity of the eigenvalue and the transpose of a matrix has the same eigenvalues as the matrix.

The rank of the sum of two matrices is equal to or less than the sum of the ranks of the matrices. Furthermore, the rank of a nonzero scalar times a matrix is equal to the rank of the matrix. Hence, we have:

$$\text{rank } A_c \leq \text{rank } R + \text{rank } CC^*$$

where:

$$R = (I - CC^*)A_p \tag{C-7}$$

If M_1 and M_2 are pxr and rxq matrices, respectively, and each is of rank r, then M_1M_2 is of rank r. Hence, the matrix CC* has rank c. If the rank of a square matrix of dimension n is r, then at least n-r of the eigenvalues of the matrix are zero. Furthermore, a necessary condition for linear control system asymptotic stability, that is, for no disturbance, $\underline{x} \to 0$ as $t \to \infty$. $\forall\ \underline{x}(0)$, is that all of the eigenvalues of the controlled plant matrix have negative real parts. Therefore, a necessary condition for R is:

$$\text{rank } R \geq n-c$$

The rank of the product of two matrices can be no greater than the rank of either matrix. Thus, if r_ℓ of the columns of A_p are linearly independent and $r_\ell \leq n-c$, then the rank of R is less than or equal to n-c. If the jth column of A_p is in the range of C, that is, if $\underline{A}_{pj} = C\underline{c}$ where $\underline{A}_{pj}$ is the jth column of A_p and $\underline{c}$ is a c component constant vector, then the jth column of R is zero. Thus, if r of the columns of A_p are linearly independent and r > n-c, then r+c-n of the columns of R will be zero and n-r will be zero or linearly dependent, that is, the rank of R will be n-c. Therefore, for the minimum $(\text{tr } E_c{}^T E_{\bar{c}})^{\frac{1}{2}}$ solution for G to be asymptotically stable, it is necessary that the rank of R be n-c, that is, that n-c columns of the plant matrix must be linearly independent from the columns of C.

APPENDIX D

Algorithm for Generating Optimum State Controller or Estimator Gain Matrix

1. Compute $K = C^*(A_p + \frac{I}{T} I)$ or

$$= (A + \frac{20}{T} I)\ B^T\ (B_p B_p^{\ T})^{-1}$$

2. Set $\underline{e}_k = n^{-\frac{1}{2}} (1, 1, ----, 1)^T$

3. Set $\lambda_k = 0$

4. Go to subroutine.

5. Set $\underline{e} = \underline{e}_{k+1} / |\underline{e}_{k+1}|$

6. Set $\lambda = \lambda_{k+1}$

7. Compute $\delta = 0.01$ largest $|k_{ij}|$

8. Set $i = 1$

9. Set $j = 1$

10. Set $k_{ij} = k_{ij} + \delta$

11. Set $\underline{e}_k = \underline{e}$

12. Set $\lambda_k = \lambda$

13. Go to subroutine.

14. Compute $\delta_{ij} = \lambda_{k+1} - \lambda$

15. Set $k_{ij} = k_{ij} - \delta$

16. If $j = n(m)$, go to step 19.

17. Set $j = j+1$

18. Go to step 10.

19. If $i = c$ (dimension of $\underline{x}$), go to step 22.

20. Set $i = i+1$

21. Go to step 9.

22. Compute Δ = largest $|\delta_{ij}|$

23. Set $K = K - \frac{\delta}{\Delta}\left[\delta_{ij}\right]$

24. Set $\underline{e}_k = \underline{e}$

25. Set $\lambda_k = \lambda$

26. Go to subroutine.

27. If $|\lambda_{k+1} - \lambda| / \lambda_{k+1} > 0.01$, go to step 5.

28. Set G or H = K

SUBROUTINE

1. Compute $E = W_c (A_p - CK + \frac{1}{T} I) W_c^*$ or

   $= W_e (A - KB + \frac{20}{T} I) W_e^*$

2. Compute $\underline{e}_{k+1} = E^T E \, \underline{e}_k$

3. Compute $\underline{\lambda}_{k+1} = | \underline{e}_{k+1} |$

4. If $\lambda_{k+1} \leq 0$, go to step 6.

5. If $| \lambda_{k+1} - \lambda_k | / \lambda_{k+1} < 0.01$, return.

6. Set $\underline{e}_k = \underline{e}_{k+1} / | \underline{e}_{k+1}$

7. Set $\lambda_k = \lambda_{k+1}$

8. Go to step 2.

APPENDIX E

Derivation and Analysis of Minimum $(\text{trace } E_e^T E_e)^{\frac{1}{2}}$ Solution for State Estimation Gain Matrix H

The problem, minimize $|B^T\underline{x}_i - \underline{y}_i|^2$ with respect to $\underline{x}_i$ where:

$\underline{x}_i^T$ = ith row of H

$\underline{y}_i^T$ = ith row of $A + \frac{20}{T} I$,

is equivalent to the problem, minimize $(tr\ E_e^T E_e)^{\frac{1}{2}}$ with respect to H where:

$E_e = A - HB + \frac{20}{T} I$

I = identity matrix of dimension A

Expanding $\left|B^T\underline{x}_i - \underline{y}_i\right|^2$ yields:

$\underline{x}_i^T BB^T \underline{x}_i - 2\underline{y}_i^T B^T \underline{x}_i + \underline{y}_i^T \underline{y}_i$

Taking the gradient with respect to $\underline{x}_i$, setting equal to zero for a critical value and solving for $\underline{x}_i^T$, we have

$$\underline{x}_i^T = \underline{y}_i^T B^T (BB^T)^{-1} \qquad \text{(E-1)}$$

where:

$$B = \left[B_p \;\vdots\; 0 \;\vdots\; 0 \right] \tag{7-44}$$

Therefore:

$$H = (A + \frac{20}{T} I)\; B^T\; (B_p B_p^T)^{-1} \tag{E-2}$$

Substitution of (E-2) into equation (7-42) yields:

$$\dot{\underline{x}}_e = \left[\begin{array}{c|c|c} A_c - H_1 B_p & 0 & DB_w \\ \hline 0 & A_v & 0 \\ \hline 0 & 0 & A_w \end{array}\right] \underline{x}_e + \left[\begin{array}{c} D \\ \hline 0 \\ \hline 0 \end{array}\right] \underline{w}_k + \left[\begin{array}{c} H_1 \\ \hline 0 \\ \hline 0 \end{array}\right] \underline{y}$$

where: (E-3)

$$H_1 = (A_c + \frac{20}{T} I)\; B_p^T\; (B_p B_p^T)^{-1}. \tag{E-4}$$

Since

$$\underline{x}_e\,(0) = \left[\, \underline{y}^T(0)\; (B_p B_p^T)^{-1} B_p \;\vdots\; \underline{0} \;\vdots\; \underline{0} \,\right]^T, \tag{E-5}$$

the estimates for $\underline{x}_v$ and $\underline{x}_w$ and thus the estimates for the unknown part of the control and plant disturbances are zero for all time.

APPENDIX F

EQUATIONS FOR THE FULL BEAM AND SPLIT-BEAM

EQUATIONS FOR THE FULL BEAM AND SPLIT-BEAM

F.1 Translational equations for the full beam

(i) $$m\ddot{\mu}_1 + (K+K_1)\mu_1 - K_1\mu_2 - K\mu_3 - (K_\phi + K_{\phi_1})\beta_1 - K_{\phi_1}\beta_2 - K_\phi\beta_3 = F'_{e_1}$$

(ii) $$m\ddot{\mu}_2 + (K+K_1)\mu_2 - K_1\mu_1 - K\mu_4 - (K_\phi - K_{\phi_1})\beta_2 + K_{\phi_1}\beta_1 - K_\phi\beta_4 = F'_{e_2}$$

(iii) $$m\ddot{\mu}_i + (2K+K_1)\mu_i - K\mu_{i-2} - K_1\mu_{i+1} - K\mu_{i+2} - K_{\phi_1}\beta_i + K_\phi\beta_{i-2} - K_{\phi_1}\beta_{i+1} - K_\phi\beta_{i+2} = F'_{e_i}$$

$$i = 3,5,\ldots\ldots,2n-3$$

(iv) $$m\ddot{\mu}_i + (2K+K_1)\mu_i - K\mu_{i-2} - K_1\mu_{i-1} - K\mu_{i+2} + K_{\phi_1}\beta_i + K_\phi\beta_{i-2} + K_{\phi_1}\beta_{i-1} - K_\phi\beta_{i+2} = F'_{e_i}$$

$$i = 4,6,\ldots\ldots,2n-2$$

(v) $$m\ddot{\mu}_{2n-1} + (K+K_1)\mu_{2n-1} - K_1\mu_{2n} - K\mu_{2n-3} - (K_{\phi_1} - K_\phi)\beta_{2n-1} - K_{\phi_1}\beta_{2n} + K_\phi\beta_{2n-3} = F'_{e_{2n-1}}$$

(vi) $$m\ddot{\mu}_{2n} + (K+K_1)\mu_{2n} - K_1\mu_{2n-1} - K\mu_{2n-2} + (K_{\phi_1} + K_\phi)\beta_{2n} + K_{\phi_1}\beta_{2n-1} + K_\phi\beta_{2n-2} = F'_{e_{2n}}$$

where

$$F'_{e_i} = F_{e_i} - \frac{m}{M_T}F_e + m\,\tilde{r}_i\,\dot{\omega}_o$$

F.2 Rotational equations for the full beam

(i) $$J\ddot{\beta}_1 + K_a\beta_1+K_{b_1}\beta_2+K_b\beta_3 + (K_\phi+K_{\phi_1})\mu_1-K_{\phi_1}\mu_2-K_\phi\mu_3 = T'_{e_1}$$

(ii) $$J\ddot{\beta}_2 + K_a\beta_2+K_{b_1}\beta_1+K_b\beta_4 + (K_\phi-K_{\phi_1})\mu_2+K_{\phi_1}\mu_1-K_\phi\mu_4 = T'_{e_2}$$

(iii) $$J\ddot{\beta}_i+K_d\beta_i+K_b\beta_{i-2}+K_{b_1}\beta_{i+1}+K_b\beta_{i+2}+K_{\phi_1}\mu_i+K_\phi\mu_{i-2}$$

$$-K_{\phi_1}\mu_{i+1}-K_\phi\mu_{i+2} = T'_{e_i}$$

$$i = 3,5,\ldots\ldots,2n-3$$

(iv) $$J\ddot{\beta}_i+K_d\beta_i+K_b\beta_{i-2}+K_{b_1}\beta_{i-1}+K_b\beta_{i+2}-K_{\phi_1}\mu_i+K_\phi\mu_{i-2}$$

$$+K_{\phi_1}\mu_{i-1}-K_\phi\mu_{i+2} = T'_{e_i}$$

$$i = 4,6,\ldots\ldots,2n-2$$

(v) $$J\ddot{\beta}_{2n-1}+K_a\beta_{2n-1}+K_{b_1}\beta_{2n}+K_b\beta_{2n-3}+(K_{\phi_1}-K_\phi)\mu_{2n-1}-K_{\phi_1}\mu_{2n}+K_\phi\mu_{2n-3}$$

$$= T'_{e_{2n-1}}$$

(vi) $$J\ddot{\beta}_{2n}+K_a\beta_{2n}+K_{b_1}\beta_{2n-1}+K_b\beta_{2n-2}-(K_{\phi_1}+K_\phi)\mu_{2n}+K_{\phi_1}\mu_{2n-1}+K_\phi\mu_{2n-2}$$

$$= T'_{e_{2n}}$$

where $K_a = K_\theta+K_{\theta_1}+K_\psi+K_{\psi_1}$

$K_d = K_\theta+K_\psi+K_a$

$K_b = K_\psi-K_\theta$

$K_{b1} = K_{\psi_1}-K_{\theta_1}$

$T'_{e_i} = T_{e_i}+\tilde{\gamma}_i\, F_{e_i} - J\dot{\omega}_o$

F.3 Translational equations for the bodies involved in the connection of half-beams

(i) $$m\ddot{\mu}_{n-1}+m\tilde{\varepsilon}_{n-1}\ddot{\beta}_{n-1}-0.5K\mu_{n+3}-0.5K_1\mu_{n+2}+0.5(K+K_1)\mu_{n+1}$$
$$-0.5K_1\mu_n+0.5(K+K_1)\mu_{n-1}-0.5K\mu_{n-3}-0.5(K_\phi+K_{\phi_1})\beta_{n+1}$$
$$-0.5K_{\phi_1}\beta_n-0.5(K_{\phi_1}-K_\phi)\beta_{n-1}+0.5K_\phi\beta_{n-3}-0.5K_\phi\beta_{n+3}-0.5K_{\phi_1}\beta_{n+2}$$
$$= F'_{e_{n-1}}$$

(ii) $$m\ddot{\mu}_n+m\tilde{\varepsilon}_n\ddot{\beta}_n-0.5K\mu_{n+4}+0.5(K+K_1)\mu_{n+2}-0.5K_1\mu_{n+1}$$
$$+0.5(K+K_1)\mu_n-0.5K_1\mu_{n-1}-0.5K\mu_{n-2}+0.5K_{\phi_1}\beta_{n+1}$$
$$+0.5(K_\phi+K_{\phi_1})\beta_n+0.5K_{\phi_1}\beta_{n-1}+0.5K_\phi\beta_{n-2}$$
$$-0.5K_\phi\beta_{n+4}-0.5(K_\phi-K_{\phi_1})\beta_{n+2} = F'_{e_n}$$

(iii) $$m\ddot{\mu}_{n+1}+m\tilde{\varepsilon}_{n+1}\ddot{\beta}_{n+1} -0.5K\mu_{n+3}-0.5K_1\mu_{n+2}+0.5(K+K_1)\mu_{n+1}-0.5K_1\mu_n$$
$$+0.5(K+K_1)\mu_{n-1}-0.5K\mu_{n-3}-0.5(K_\phi+K_{\phi_1})\beta_{n+1}-0.5K_{\phi_1}\beta_n$$
$$+0.5(K_\phi-K_{\phi_1})\beta_{n-1}+0.5K_\phi\beta_{n-3}-0.5K_{\phi_1}\beta_{n-2}-0.5K_\phi\beta_{n+3} = F'_{e_{n+1}}$$

(iv) $$m\ddot{\mu}_{n+2}+m\tilde{\varepsilon}_{n+2}\ddot{\beta}_{n+2} -0.5K\mu_{n+4} +0.5(K+K_1)\mu_{n+2} -0.5K_1\mu_{n+1}$$
$$+0.5(K+K_1)\mu_n-0.5K_1\mu_{n-1}-0.5K\mu_{n-2}-0.5(K_\phi-K_{\phi_1})\beta_{n+2}$$
$$+0.5K_{\phi_1}\beta_{n+1}+0.5(K_\phi+K_{\phi_1})\beta_n+0.5K_{\phi_1}\beta_{n-1}$$
$$+0.5K_\phi\beta_{n-2}-0.5K_\phi\beta_{n+4} = F'_{e_{n+2}}$$

where: $$F'_{e_i} = \tfrac{1}{2}(F_{e_i}+F_{e_j})-\frac{m}{M_{T_\ell}}\,{}_\ell F_e+m({}_\ell r_i-\varepsilon_i)\dot{\tilde{\omega}}_{o\ell}$$

$\ell=1$ for $i=n-1,n$

$\ell=2$ for $i=n+1,n+2$

$j=i+(-1)^{\ell+1}2$

F.4 Rotational equations for the bodies involved in the connection of half-beams

(i) $$(J+J_1^*)\ddot{\beta}_{n-1} - K_\phi(\mu_{n+3}-\mu_{n+1}) - d_1^* K_1(\mu_{n+2}-\mu_{n+1})$$
$$-d_2^* K_1(\mu_n-\mu_{n-1}) - K_\phi(\mu_{n-1}-\mu_{n-3})$$
$$+(K_\psi-0.5K_\theta)\beta_{n+3}+(K_\psi+0.5K_\theta+K_{\psi_{11}}+0.5K_{\theta_1})\beta_{n+1}$$
$$+(K_{\psi_{11}}-0.5K_{\theta_1})\beta_{n+2}+(K_\psi+0.5K_\theta+K_{\psi_{12}}+0.5K_{\theta_1})\beta_{n-1}$$
$$+(K_{\psi_{12}}-0.5K_{\theta_1})\beta_n+(K_\psi-0.5K_\theta)\beta_{n-3}$$
$$= T''_{e_{n-1}} - (J+J_1^*)\dot{\omega}_{o_1}$$

(ii) $$J\ddot{\beta}_n - J\ddot{\beta}_{n+2} = J\dot{\omega}_{o_2} - J\dot{\omega}_{o_1}$$

(iii) $$J\ddot{\beta}_{n+1} - J\ddot{\beta}_{n-1} = J\dot{\omega}_{o_1} - J\dot{\omega}_{o_2}$$

(iv) $$(J+J_2^*)\ddot{\beta}_{n+2} - K_\phi(\mu_{n+4}-\mu_{n+2}) - d_3^* K_1(\mu_{n+1}-\mu_{n+2})$$
$$-d_4^* K_1(\mu_{n-1}-\mu_n) - K_\phi(\mu_n-\mu_{n-2})$$
$$+(K_\psi-0.5K_\theta)\beta_{n+4}+(K_\psi+0.5K_\theta+K_{\psi_{13}}+0.5K_{\theta_1})\beta_{n+2}$$
$$+(K_{\psi_{13}}-0.5K_{\theta_1})\beta_{n+1}+(K_\psi+0.5K_\theta+K_{\psi_{14}}+0.5K_{\theta_1})\beta_n$$
$$+(K_{\psi_{14}}-0.5K_{\theta_1})\beta_{n-1}+(K_\psi-0.5K_\theta)\beta_{n-2}$$
$$= T''_{e_{n+2}} - (J+J_2^*)\dot{\omega}_{o_2}$$

where:

$$J_1^* = J_2^* = m\ \tilde{d}_{13}\ \tilde{\varepsilon}_{n-1}$$

$$d_1^* = -d_4^* = \tfrac{1}{2}\ (\tilde{d}_{12} - \tilde{d}_{31})$$

$$d_2^* = -d_3^* = \tfrac{1}{2}\ (\tilde{d}_{12} - \tilde{d}_{13})$$

$$K_{\psi_{11}} = -d_1^*\ K_1\ \tilde{d}_{12} = K_{\psi_{14}}$$

$$K_{\psi_{12}} = -d_2^*\ K_1\ \tilde{d}_{12} = K_{\psi_{13}}$$

APPENDIX G

MODE SHAPES OF THE NATURAL FREQUENCIES FOR THE ORIGINAL BEAM

NATURAL FREQUENCY= .582178E+02

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.33024E+00	0.00000	.23506E-12	0.00000	.44892E-12	0.00000	.17900E-13	0.00000	-.19128E-12	0.00000	-.97421E-01	0.00000
-.33024E+00	0.00000	.18507E-12	0.00000	.43009E-12	0.00000	-.12107E-14	0.00000	-.19146E-12	0.00000	-.97421E-01	0.00000
-.13612E+00	0.00000	.19979E-12	0.00000	.41581E-12	0.00000	-.25446E-13	0.00000	-.14710E-12	0.00000	-.92806E-01	0.00000
-.13612E+00	0.00000	.21906E-12	0.00000	.42516E-12	0.00000	-.11676E-13	0.00000	-.16659E-12	0.00000	-.92806E-01	0.00000
.40347E-01	0.00000	.22347E-12	0.00000	.42605E-12	0.00000	-.23142E-13	0.00000	-.15103E-12	0.00000	-.78165E-01	0.00000
.40347E-01	0.00000	.22219E-12	0.00000	.42456E-12	0.00000	-.10890E-13	0.00000	-.16981E-12	0.00000	-.78165E-01	0.00000
.17602E+00	0.00000	.25549E-12	0.00000	.38871E-12	0.00000	-.15673E-13	0.00000	-.97336E-13	0.00000	-.52494E-01	0.00000
.17602E+00	0.00000	.18088E-12	0.00000	.39316E-12	0.00000	-.21793E-13	0.00000	-.10153E-12	0.00000	-.52494E-01	0.00000
.24998E+00	0.00000	.27174E-12	0.00000	.31708E-12	0.00000	-.41159E-13	0.00000	-.11119E-12	0.00000	-.18519E-01	0.00000
.24998E+00	0.00000	.18365E-12	0.00000	.32013E-12	0.00000	-.43248E-13	0.00000	-.11533E-12	0.00000	-.18519E-01	0.00000
.24998E+00	0.00000	.28040E-12	0.00000	.20839E-12	0.00000	-.64740E-13	0.00000	-.11087E-12	0.00000	.18519E-01	0.00000
.24998E+00	0.00000	.17390E-12	0.00000	.20150E-12	0.00000	-.64916E-13	0.00000	-.10761E-12	0.00000	.18519E-01	0.00000
.17602E+00	0.00000	.30439E-12	0.00000	.69439E-13	0.00000	-.72611E-13	0.00000	-.11264E-12	0.00000	.52494E-01	0.00000
.17602E+00	0.00000	.15919E-12	0.00000	.65218E-13	0.00000	-.76297E-13	0.00000	-.10572E-12	0.00000	.52494E-01	0.00000
.40347E-01	0.00000	.30699E-12	0.00000	-.10000E-12	0.00000	-.73817E-13	0.00000	-.90325E-13	0.00000	.78165E-01	0.00000
.40347E-01	0.00000	.14783E-12	0.00000	-.98366E-13	0.00000	-.74489E-13	0.00000	-.92761E-13	0.00000	.78165E-01	0.00000
-.13612E+00	0.00000	.31357E-12	0.00000	-.26887E-12	0.00000	-.78778E-13	0.00000	-.90483E-13	0.00000	.92806E-01	0.00000
-.13612E+00	0.00000	.15218E-12	0.00000	-.26803E-12	0.00000	-.81236E-13	0.00000	-.93835E-13	0.00000	.92806E-01	0.00000
-.33024E+00	0.00000	.30778E-12	0.00000	-.43672E-12	0.00000	-.79988E-13	0.00000	-.73684E-13	0.00000	.97421E-01	0.00000
-.33024E+00	0.00000	.15372E-12	0.00000	-.43907E-12	0.00000	-.81589E-13	0.00000	-.67896E-13	0.00000	.97421E-01	0.00000

NATURAL FREQUENCY= .102354E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.31516E-12	0.00000	.78616E-01	0.00000	.31678E+00	0.00000	-.84774E-01	0.00000	-.66182E-12	0.00000	.54916E-14	0.00000
.10627E-11	0.00000	-.78616E-01	0.00000	.31678E+00	0.00000	-.84774E-01	0.00000	-.67659E-12	0.00000	.62450E-13	0.00000
-.31959E-12	0.00000	.73599E-01	0.00000	.13696E+00	0.00000	-.83511E-01	0.00000	-.60907E-12	0.00000	.11193E-13	0.00000
.85837E-12	0.00000	-.73599E-01	0.00000	.13696E+00	0.00000	-.83511E-01	0.00000	-.58525E-12	0.00000	.91650E-13	0.00000
-.25727E-12	0.00000	.61146E-01	0.00000	-.35149E-01	0.00000	-.72074E-01	0.00000	-.47129E-12	0.00000	-.38747E-13	0.00000
.69870E-12	0.00000	-.61146E-01	0.00000	-.35149E-01	0.00000	-.72074E-01	0.00000	-.46274E-12	0.00000	.10444E-12	0.00000
-.63464E-13	0.00000	.40736E-01	0.00000	-.17154E+00	0.00000	-.49080E-01	0.00000	-.30735E-12	0.00000	-.92123E-13	0.00000
.52575E-12	0.00000	-.40736E-01	0.00000	-.17154E+00	0.00000	-.49080E-01	0.00000	-.31459E-12	0.00000	.51963E-13	0.00000
.20445E-12	0.00000	.14319E-01	0.00000	-.24704E+00	0.00000	-.17422E-01	0.00000	-.88757E-13	0.00000	-.11787E-12	0.00000
.38924E-12	0.00000	-.14319E-01	0.00000	-.24704E+00	0.00000	-.17422E-01	0.00000	-.10337E-12	0.00000	.46953E-13	0.00000
.43339E-12	0.00000	-.14319E-01	0.00000	-.24704E+00	0.00000	.17422E-01	0.00000	.12209E-12	0.00000	-.81230E-13	0.00000
.20064E-12	0.00000	.14319E-01	0.00000	-.24704E+00	0.00000	.17422E-01	0.00000	.10819E-12	0.00000	.85473E-13	0.00000
.61793E-12	0.00000	-.40736E-01	0.00000	-.17154E+00	0.00000	.49080E-01	0.00000	.34900E-12	0.00000	-.49726E-13	0.00000
-.56045E-13	0.00000	.40736E-01	0.00000	-.17154E+00	0.00000	.49080E-01	0.00000	.33856E-12	0.00000	.96801E-13	0.00000
.69625E-12	0.00000	-.61146E-01	0.00000	-.35149E-01	0.00000	.72074E-01	0.00000	.49157E-12	0.00000	-.24159E-14	0.00000
-.32920E-12	0.00000	.61146E-01	0.00000	-.35149E-01	0.00000	.72074E-01	0.00000	.47998E-12	0.00000	.95940E-13	0.00000
.64404E-12	0.00000	-.73599E-01	0.00000	.13696E+00	0.00000	.83511E-01	0.00000	.63042E-12	0.00000	.47646E-13	0.00000
-.58170E-12	0.00000	.73599E-01	0.00000	.13696E+00	0.00000	.83511E-01	0.00000	.62428E-12	0.00000	.10791E-12	0.00000
.52179E-12	0.00000	-.78616E-01	0.00000	.31678E+00	0.00000	.84774E-01	0.00000	.69167E-12	0.00000	.91322E-13	0.00000
-.78664E-12	0.00000	.78616E-01	0.00000	.31678E+00	0.00000	.84774E-01	0.00000	.67920E-12	0.00000	.98788E-13	0.00000

NATURAL FREQUENCY= .125539E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.22354E+00	0.00000	-.18766E-12	0.00000	-.75533E-12	0.00000	.12264E-12	0.00000	-.21974E+00	0.00000	-.73770E-02	0.00000
.22354E+00	0.00000	.10071E-12	0.00000	-.77468E-12	0.00000	.12928E-12	0.00000	-.21974E+00	0.00000	.73770E-02	0.00000
-.19912E+00	0.00000	-.15666E-12	0.00000	-.48719E-12	0.00000	.14496E-12	0.00000	-.19664E+00	0.00000	-.12383E-01	0.00000
.19912E+00	0.00000	.84686E-13	0.00000	-.48399E-12	0.00000	.16226E-12	0.00000	-.19664E+00	0.00000	.12383E-01	0.00000
-.15772E+00	0.00000	-.13927E-12	0.00000	-.16621E-12	0.00000	.16836E-12	0.00000	-.15559E+00	0.00000	-.18413E-01	0.00000
.15772E+00	0.00000	.73263E-13	0.00000	-.16678E-12	0.00000	.13743E-12	0.00000	-.15559E+00	0.00000	.18413E-01	0.00000
-.10123E+00	0.00000	-.10343E-12	0.00000	.16081E-12	0.00000	.12179E-12	0.00000	-.99800E-01	0.00000	-.23107E-01	0.00000
.10123E+00	0.00000	.98634E-13	0.00000	.14691E-12	0.00000	.12327E-12	0.00000	-.99800E-01	0.00000	.23107E-01	0.00000
-.34880E-01	0.00000	-.68650E-13	0.00000	.38778E-12	0.00000	.79764E-13	0.00000	-.34379E-01	0.00000	-.25603E-01	0.00000
.34880E-01	0.00000	.35842E-13	0.00000	.38865E-12	0.00000	.86219E-13	0.00000	-.34379E-01	0.00000	.25603E-01	0.00000
.34880E-01	0.00000	-.66851E-15	0.00000	.48409E-12	0.00000	.79123E-14	0.00000	.34379E-01	0.00000	-.25603E-01	0.00000
-.34880E-01	0.00000	-.11260E-13	0.00000	.48423E-12	0.00000	.38149E-14	0.00000	.34379E-01	0.00000	.25603E-01	0.00000
.10123E+00	0.00000	.33282E-13	0.00000	.40926E-12	0.00000	-.78530E-13	0.00000	.99800E-01	0.00000	-.23107E-01	0.00000
-.10123E+00	0.00000	-.54744E-13	0.00000	.40942E-12	0.00000	-.80777E-13	0.00000	.99800E-01	0.00000	.23107E-01	0.00000
.15772E+00	0.00000	.11186E-12	0.00000	.18029E-12	0.00000	-.13214E-12	0.00000	.15559E+00	0.00000	-.18413E-01	0.00000
-.15772E+00	0.00000	-.11649E-12	0.00000	.17932E-12	0.00000	-.13865E-12	0.00000	.15559E+00	0.00000	.18413E-01	0.00000
.19912E+00	0.00000	.15016E-12	0.00000	-.16394E-12	0.00000	-.16729E-12	0.00000	.19664E+00	0.00000	-.12383E-01	0.00000
-.19912E+00	0.00000	-.15463E-12	0.00000	-.16328E-12	0.00000	-.15780E-12	0.00000	.19664E+00	0.00000	.12383E-01	0.00000
.22354E+00	0.00000	.15390E-12	0.00000	-.53835E-12	0.00000	-.17518E-12	0.00000	.21974E+00	0.00000	-.73770E-02	0.00000
-.22354E+00	0.00000	-.15791E-12	0.00000	-.53820E-12	0.00000	-.17531E-12	0.00000	.21974E+00	0.00000	.73770E-02	0.00000

NATURAL FREQUENCY= .151409E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.25021E+00	0.00000	-.41304E-13	0.00000	-.12909E-12	0.00000	-.87225E-14	0.00000	-.57051E-12	0.00000	.15155E+00	0.00000
.25021E+00	0.00000	-.78432E-14	0.00000	-.11360E-12	0.00000	-.12384E-13	0.00000	-.58822E-12	0.00000	.15155E+00	0.00000
-.45077E-01	0.00000	-.17111E-13	0.00000	-.11016E-12	0.00000	.31822E-14	0.00000	-.38982E-12	0.00000	.12380E+00	0.00000
-.45077E-01	0.00000	-.11525E-13	0.00000	-.10871E-12	0.00000	.36748E-13	0.00000	-.44250E-12	0.00000	.12380E+00	0.00000
-.23879E+00	0.00000	-.34042E-13	0.00000	-.62174E-13	0.00000	.42619E-13	0.00000	-.24055E-12	0.00000	.53568E-01	0.00000
-.23879E+00	0.00000	-.72684E-14	0.00000	-.63381E-13	0.00000	.19044E-13	0.00000	-.23783E-12	0.00000	.53568E-01	0.00000
-.25664E+00	0.00000	-.12962E-13	0.00000	.11813E-13	0.00000	.27109E-13	0.00000	-.64274E-13	0.00000	-.33033E-01	0.00000
-.25664E+00	0.00000	.15392E-13	0.00000	-.26950E-14	0.00000	.21538E-13	0.00000	-.81027E-13	0.00000	-.33033E-01	0.00000
-.10818E+00	0.00000	-.13379E-13	0.00000	.67801E-13	0.00000	.22367E-13	0.00000	.30246E-13	0.00000	-.92302E-01	0.00000
-.10818E+00	0.00000	.12076E-13	0.00000	.68269E-13	0.00000	.24985E-13	0.00000	.41292E-13	0.00000	-.92302E-01	0.00000
.10818E+00	0.00000	-.82825E-15	0.00000	.11541E-12	0.00000	.11550E-13	0.00000	.14048E-12	0.00000	-.92302E-01	0.00000
.10818E+00	0.00000	.10438E-13	0.00000	.11507E-12	0.00000	.85977E-14	0.00000	.13238E-12	0.00000	-.92302E-01	0.00000
.25664E+00	0.00000	.20557E-13	0.00000	.11679E-12	0.00000	-.72863E-14	0.00000	.17142E-12	0.00000	-.33033E-01	0.00000
.25664E+00	0.00000	-.12189E-13	0.00000	.11587E-12	0.00000	-.90409E-14	0.00000	.17711E-12	0.00000	-.33033E-01	0.00000
.23879E+00	0.00000	.36234E-13	0.00000	.68165E-13	0.00000	-.33719E-13	0.00000	.18109E-12	0.00000	.53568E-01	0.00000
.23879E+00	0.00000	-.16520E-13	0.00000	.67429E-13	0.00000	-.35274E-13	0.00000	.17793E-12	0.00000	.53568E-01	0.00000
.45077E-01	0.00000	.35264E-13	0.00000	-.17475E-13	0.00000	-.47659E-13	0.00000	.14074E-12	0.00000	.12380E+00	0.00000
.45077E-01	0.00000	-.24594E-13	0.00000	-.17399E-13	0.00000	-.49441E-13	0.00000	.15701E-12	0.00000	.12380E+00	0.00000
-.25021E+00	0.00000	.51266E-13	0.00000	-.11938E-12	0.00000	-.45753E-13	0.00000	.10222E-12	0.00000	.15155E+00	0.00000
-.25021E+00	0.00000	-.34450E-13	0.00000	-.11934E-12	0.00000	-.45136E-13	0.00000	.87840E-13	0.00000	.15155E+00	0.00000

NATURAL FREQUENCY= .225557E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.73557E-13	0.00000	-.10536E+00	0.00000	-.22956E+00	0.00000	.12496E+00	0.00000	.72586E-13	0.00000	.23260E-13	0.00000
-.99821E-13	0.00000	.10536E+00	0.00000	-.22956E+00	0.00000	.12496E+00	0.00000	.11061E-12	0.00000	-.12916E-13	0.00000
-.90368E-14	0.00000	-.86253E-01	0.00000	.44973E-01	0.00000	.10898E+00	0.00000	.31877E-13	0.00000	.27681E-14	0.00000
-.80689E-13	0.00000	.86253E-01	0.00000	.44973E-01	0.00000	.10898E+00	0.00000	.26037E-13	0.00000	-.14777E-13	0.00000
-.74290E-13	0.00000	-.47082E-01	0.00000	.23930E+00	0.00000	.52710E-01	0.00000	.76948E-16	0.00000	.37080E-13	0.00000
-.92464E-13	0.00000	.47082E-01	0.00000	.23930E+00	0.00000	.52710E-01	0.00000	.46746E-14	0.00000	-.22096E-13	0.00000
-.13750E-12	0.00000	-.14401E-02	0.00000	.26101E+00	0.00000	-.21327E-01	0.00000	-.44402E-13	0.00000	.26890E-13	0.00000
-.18732E-13	0.00000	.14401E-02	0.00000	.26101E+00	0.00000	-.21327E-01	0.00000	-.51447E-13	0.00000	-.30841E-14	0.00000
-.18877E-12	0.00000	.29239E-01	0.00000	.11078E+00	0.00000	-.73073E-01	0.00000	-.67392E-13	0.00000	.15801E-13	0.00000
-.55179E-14	0.00000	-.29239E-01	0.00000	.11078E+00	0.00000	-.73073E-01	0.00000	-.11362E-12	0.00000	.13449E-14	0.00000
-.14487E-12	0.00000	.29239E-01	0.00000	-.11078E+00	0.00000	-.73073E-01	0.00000	-.95848E-13	0.00000	-.33960E-13	0.00000
.65318E-13	0.00000	-.29239E-01	0.00000	-.11078E+00	0.00000	-.73073E-01	0.00000	-.97707E-13	0.00000	-.30798E-13	0.00000
-.23899E-13	0.00000	-.14401E-02	0.00000	-.26101E+00	0.00000	-.21327E-01	0.00000	-.37505E-13	0.00000	-.33131E-13	0.00000
.69840E-13	0.00000	.14401E-02	0.00000	-.26101E+00	0.00000	-.21327E-01	0.00000	-.44819E-13	0.00000	.26797E-13	0.00000
.43022E-13	0.00000	-.47082E-01	0.00000	-.23930E+00	0.00000	.52710E-01	0.00000	.27954E-13	0.00000	-.45212E-15	0.00000
-.11795E-13	0.00000	.47082E-01	0.00000	-.23930E+00	0.00000	.52710E-01	0.00000	.26759E-13	0.00000	.63708E-13	0.00000
.34253E-13	0.00000	-.86253E-01	0.00000	-.44973E-01	0.00000	.10898E+00	0.00000	.71452E-13	0.00000	.20525E-13	0.00000
-.15086E-12	0.00000	.86253E-01	0.00000	-.44973E-01	0.00000	.10898E+00	0.00000	.64051E-13	0.00000	.90780E-13	0.00000
.23073E-13	0.00000	-.10536E+00	0.00000	.22956E+00	0.00000	.12496E+00	0.00000	.97716E-13	0.00000	.27731E-13	0.00000
-.25547E-12	0.00000	.10536E+00	0.00000	.22956E+00	0.00000	.12496E+00	0.00000	.98913E-13	0.00000	.84522E-13	0.00000

NATURAL FREQUENCY= .249856E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.22113E+00	0.00000	-.36942E-13	0.00000	-.13567E-12	0.00000	.46251E-13	0.00000	.20756E+00	0.00000	.29049E-01	0.00000
-.22113E+00	0.00000	.74210E-13	0.00000	-.14488E-12	0.00000	.50656E-13	0.00000	.20756E+00	0.00000	-.29049E-01	0.00000
.12808E+00	0.00000	-.10907E-13	0.00000	-.71271E-13	0.00000	.50266E-13	0.00000	.12300E+00	0.00000	.43154E-01	0.00000
-.12808E+00	0.00000	.24951E-13	0.00000	-.43642E-13	0.00000	.54433E-13	0.00000	.12300E+00	0.00000	-.43154E-01	0.00000
-.36490E-02	0.00000	.57650E-14	0.00000	.48886E-14	0.00000	.79109E-14	0.00000	-.29158E-02	0.00000	.50109E-01	0.00000
.36490E-02	0.00000	.23870E-13	0.00000	.93226E-14	0.00000	.19484E-13	0.00000	-.29158E-02	0.00000	-.50109E-01	0.00000
-.13300E+00	0.00000	-.19271E-13	0.00000	.29888E-13	0.00000	.66134E-14	0.00000	-.12604E+00	0.00000	.40095E-01	0.00000
.13300E+00	0.00000	.23390E-13	0.00000	.37994E-13	0.00000	.56652E-15	0.00000	-.12604E+00	0.00000	-.40095E-01	0.00000
-.21257E+00	0.00000	-.99011E-15	0.00000	.27128E-13	0.00000	-.48148E-14	0.00000	-.20161E+00	0.00000	.15271E-01	0.00000
.21257E+00	0.00000	-.78350E-14	0.00000	.26878E-13	0.00000	.11017E-14	0.00000	-.20161E+00	0.00000	-.15271E-01	0.00000
-.21257E+00	0.00000	-.68060E-14	0.00000	-.11583E-13	0.00000	-.12105E-13	0.00000	-.20161E+00	0.00000	-.15271E-01	0.00000
.21257E+00	0.00000	-.74996E-14	0.00000	-.11434E-13	0.00000	-.14071E-13	0.00000	-.20161E+00	0.00000	.15271E-01	0.00000
-.13300E+00	0.00000	-.21942E-13	0.00000	-.41146E-13	0.00000	-.13414E-13	0.00000	-.12604E+00	0.00000	-.40095E-01	0.00000
.13300E+00	0.00000	-.88560E-14	0.00000	-.41457E-13	0.00000	-.89211E-14	0.00000	-.12604E+00	0.00000	.40095E-01	0.00000
-.36490E-02	0.00000	-.21579E-13	0.00000	-.41963E-13	0.00000	.10335E-13	0.00000	-.29158E-02	0.00000	-.50109E-01	0.00000
.36490E-02	0.00000	-.15484E-13	0.00000	-.41368E-13	0.00000	.80864E-14	0.00000	-.29158E-02	0.00000	.50109E-01	0.00000
.12808E+00	0.00000	-.47996E-13	0.00000	-.11672E-13	0.00000	.12407E-13	0.00000	.12300E+00	0.00000	-.43154E-01	0.00000
-.12808E+00	0.00000	-.15793E-14	0.00000	-.11722E-13	0.00000	.13802E-13	0.00000	.12300E+00	0.00000	.43154E-01	0.00000
.22113E+00	0.00000	-.42511E-13	0.00000	.37228E-13	0.00000	.20842E-13	0.00000	.20756E+00	0.00000	-.29049E-01	0.00000
-.22113E+00	0.00000	-.33967E-14	0.00000	.37014E-13	0.00000	.20690E-13	0.00000	.20756E+00	0.00000	.29049E-01	0.00000

NATURAL FREQUENCY= .275554E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.18078E+00	0.00000	.28654E-13	0.00000	.16789E-12	0.00000	-.65804E-13	0.00000	-.28612E-12	0.00000	.19098E+00	0.00000
.18078E+00	0.00000	-.82548E-13	0.00000	.15602E-12	0.00000	-.60755E-13	0.00000	-.30011E-12	0.00000	.19098E+00	0.00000
-.16829E+00	0.00000	.33581E-13	0.00000	.83018E-13	0.00000	-.15668E-13	0.00000	-.15557E-12	0.00000	.11037E+00	0.00000
-.16829E+00	0.00000	-.46950E-13	0.00000	.55301E-13	0.00000	-.51187E-13	0.00000	-.12216E-12	0.00000	.11037E+00	0.00000
-.24191E+00	0.00000	-.15902E-13	0.00000	.42213E-13	0.00000	-.13276E-13	0.00000	.68313E-13	0.00000	-.40052E-01	0.00000
-.24191E+00	0.00000	-.23959E-13	0.00000	.37223E-13	0.00000	-.25224E-13	0.00000	.57221E-13	0.00000	-.40052E-01	0.00000
-.14575E-01	0.00000	.20881E-13	0.00000	.41187E-13	0.00000	-.12179E-13	0.00000	.16666E-12	0.00000	-.12673E+00	0.00000
-.14575E-01	0.00000	-.23425E-13	0.00000	.31627E-13	0.00000	-.10934E-13	0.00000	.16476E-12	0.00000	-.12673E+00	0.00000
.24400E+00	0.00000	.17280E-13	0.00000	.18252E-13	0.00000	-.71804E-14	0.00000	.12978E-12	0.00000	-.67446E-01	0.00000
.24400E+00	0.00000	-.27229E-13	0.00000	.18625E-13	0.00000	-.43587E-14	0.00000	.13165E-12	0.00000	-.67446E-01	0.00000
.24400E+00	0.00000	.19324E-14	0.00000	.71782E-14	0.00000	-.16751E-13	0.00000	.56015E-13	0.00000	.67446E-01	0.00000
.24400E+00	0.00000	-.12863E-14	0.00000	.78971E-14	0.00000	-.11977E-13	0.00000	.64820E-13	0.00000	.67446E-01	0.00000
-.14575E-01	0.00000	.18211E-13	0.00000	-.23102E-14	0.00000	-.39400E-14	0.00000	-.10257E-13	0.00000	.12673E+00	0.00000
-.14575E-01	0.00000	.45114E-14	0.00000	-.22863E-14	0.00000	-.57491E-14	0.00000	-.68127E-14	0.00000	.12673E+00	0.00000
-.24191E+00	0.00000	.22756E-13	0.00000	-.89446E-14	0.00000	.54082E-14	0.00000	-.31389E-13	0.00000	.40052E-01	0.00000
-.24191E+00	0.00000	.69393E-14	0.00000	-.92608E-14	0.00000	.47604E-14	0.00000	-.31601E-13	0.00000	.40052E-01	0.00000
-.16829E+00	0.00000	.28917E-14	0.00000	-.24765E-14	0.00000	-.54047E-14	0.00000	-.38464E-13	0.00000	-.11037E+00	0.00000
-.16829E+00	0.00000	.31753E-13	0.00000	-.24499E-14	0.00000	-.66565E-14	0.00000	-.29961E-13	0.00000	-.11037E+00	0.00000
.18078E+00	0.00000	.17573E-13	0.00000	.10604E-13	0.00000	.72935E-14	0.00000	.45128E-13	0.00000	-.19098E+00	0.00000
.18078E+00	0.00000	.19631E-13	0.00000	.10947E-13	0.00000	.68888E-14	0.00000	.26366E-13	0.00000	-.19098E+00	0.00000

NATURAL FREQUENCY= .291931E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.48198E-13	0.00000	-.31233E+00	0.00000	.92622E-13	0.00000	.11326E-12	0.00000	.43073E-13	0.00000	.55990E-13	0.00000
.26233E-13	0.00000	-.31233E+00	0.00000	.78986E-13	0.00000	.11849E-12	0.00000	.17394E-13	0.00000	.59738E-13	0.00000
-.38260E-13	0.00000	-.28176E+00	0.00000	.30520E-12	0.00000	.36647E-13	0.00000	.40296E-13	0.00000	.36845E-13	0.00000
-.84762E-13	0.00000	-.28176E+00	0.00000	.30048E-12	0.00000	.71563E-13	0.00000	.32645E-13	0.00000	.33452E-13	0.00000
-.12229E-12	0.00000	-.22361E+00	0.00000	.26484E-12	0.00000	-.64580E-13	0.00000	.21878E-13	0.00000	-.89906E-14	0.00000
-.14783E-12	0.00000	-.22361E+00	0.00000	.25896E-12	0.00000	-.55067E-13	0.00000	.79022E-14	0.00000	-.63130E-14	0.00000
-.24597E-13	0.00000	-.14356E+00	0.00000	-.86709E-13	0.00000	-.11655E-12	0.00000	.25774E-13	0.00000	-.42029E-13	0.00000
-.67176E-13	0.00000	-.14356E+00	0.00000	-.85345E-13	0.00000	-.13086E-12	0.00000	.72138E-14	0.00000	-.52064E-13	0.00000
.11057E-12	0.00000	-.49469E-01	0.00000	-.44617E-12	0.00000	-.60303E-13	0.00000	.45773E-13	0.00000	-.58469E-13	0.00000
.21337E-13	0.00000	-.49469E-01	0.00000	-.43373E-12	0.00000	-.46109E-13	0.00000	.64022E-13	0.00000	-.43468E-13	0.00000
.19556E-12	0.00000	.49469E-01	0.00000	-.32691E-12	0.00000	.13177E-12	0.00000	.68210E-13	0.00000	.27696E-13	0.00000
.53362E-13	0.00000	.49469E-01	0.00000	-.29492E-12	0.00000	.13004E-12	0.00000	.73932E-13	0.00000	.18177E-14	0.00000
.47057E-13	0.00000	.14356E+00	0.00000	.22309E-12	0.00000	.14742E-12	0.00000	.25633E-13	0.00000	.10257E-12	0.00000
-.64273E-13	0.00000	.14356E+00	0.00000	.19367E-12	0.00000	.16778E-12	0.00000	.26756E-13	0.00000	.27942E-13	0.00000
-.18051E-12	0.00000	.22361E+00	0.00000	.53603E-12	0.00000	-.94912E-14	0.00000	-.33954E-13	0.00000	.55788E-13	0.00000
-.86254E-13	0.00000	.22361E+00	0.00000	.55405E-12	0.00000	-.44380E-14	0.00000	-.36861E-13	0.00000	-.13069E-13	0.00000
-.19441E-12	0.00000	.28176E+00	0.00000	.32509E-12	0.00000	-.23950E-12	0.00000	-.95908E-13	0.00000	-.34608E-13	0.00000
-.11819E-13	0.00000	.28176E+00	0.00000	.31917E-12	0.00000	-.25379E-12	0.00000	-.97033E-13	0.00000	-.10227E-12	0.00000
-.68978E-13	0.00000	.31233E+00	0.00000	-.40688E-12	0.00000	-.35549E-12	0.00000	-.14737E-12	0.00000	-.36354E-13	0.00000
.21170E-12	0.00000	.31233E+00	0.00000	-.42221E-12	0.00000	-.33736E-12	0.00000	-.15541E-12	0.00000	-.99203E-13	0.00000

NATURAL FREQUENCY= .363684E+03

TX REAL	TX IMAG.	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.92605E-13	0.00000	.12219E+00	0.00000	.16307E+00	0.00000	-.15552E+00	0.00000	-.72452E-13	0.00000	-.16384E-13	0.00000
.13025E-12	0.00000	-.12219E+00	0.00000	.16307E+00	0.00000	-.15552E+00	0.00000	-.11424E-12	0.00000	.17527E-13	0.00000
-.17055E-13	0.00000	.81601E-01	0.00000	-.16743E+00	0.00000	-.10002E+00	0.00000	-.77627E-14	0.00000	-.55174E-13	0.00000
.11260E-13	0.00000	-.81601E-01	0.00000	-.16743E+00	0.00000	-.10002E+00	0.00000	-.15987E-13	0.00000	.44691E-13	0.00000
.16465E-12	0.00000	.16438E-01	0.00000	-.24378E+00	0.00000	.21670E-01	0.00000	.12478E-12	0.00000	-.65964E-13	0.00000
-.59330E-13	0.00000	-.16438E-01	0.00000	-.24378E+00	0.00000	.21670E-01	0.00000	.93624E-13	0.00000	.42827E-13	0.00000
.26124E-12	0.00000	-.26035E-01	0.00000	-.10780E-01	0.00000	.97258E-01	0.00000	.15967E-12	0.00000	.37006E-13	0.00000
-.92372E-13	0.00000	.26035E-01	0.00000	-.10780E-01	0.00000	.97258E-01	0.00000	.15685E-12	0.00000	-.84861E-14	0.00000
.66056E-13	0.00000	-.17480E-01	0.00000	.25892E+00	0.00000	.53414E-01	0.00000	.56871E-13	0.00000	.10371E-12	0.00000
-.60606E-13	0.00000	.17480E-01	0.00000	.25892E+00	0.00000	.53414E-01	0.00000	.72352E-13	0.00000	-.93079E-14	0.00000
-.20320E-12	0.00000	.17480E-01	0.00000	.25892E+00	0.00000	-.53414E-01	0.00000	-.65644E-13	0.00000	.62123E-13	0.00000
-.25718E-13	0.00000	-.17480E-01	0.00000	.25892E+00	0.00000	-.53414E-01	0.00000	-.71008E-13	0.00000	-.13292E-13	0.00000
-.18682E-12	0.00000	.26035E-01	0.00000	-.10780E-01	0.00000	-.97258E-01	0.00000	-.11757E-12	0.00000	-.63798E-13	0.00000
.61155E-13	0.00000	-.26035E-01	0.00000	-.10780E-01	0.00000	-.97258E-01	0.00000	-.11090E-12	0.00000	-.57322E-13	0.00000
.13328E-13	0.00000	-.16438E-01	0.00000	-.24378E+00	0.00000	-.21670E-01	0.00000	-.61472E-13	0.00000	-.85390E-13	0.00000
.16640E-12	0.00000	.16438E-01	0.00000	-.24378E+00	0.00000	-.21670E-01	0.00000	-.58305E-13	0.00000	-.19114E-13	0.00000
.14557E-12	0.00000	-.81601E-01	0.00000	-.16743E+00	0.00000	.10002E+00	0.00000	.28795E-13	0.00000	-.21665E-14	0.00000
.99077E-13	0.00000	.81601E-01	0.00000	-.16743E+00	0.00000	.10002E+00	0.00000	.30527E-13	0.00000	.46551E-13	0.00000
.10614E-12	0.00000	-.12219E+00	0.00000	.16307E+00	0.00000	.15552E+00	0.00000	.12638E-12	0.00000	.40913E-13	0.00000
-.17543E-12	0.00000	.12219E+00	0.00000	.16307E+00	0.00000	.15552E+00	0.00000	.13148E-12	0.00000	.88263E-13	0.00000

NATURAL FREQUENCY= .372782E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.21112E+00	0.00000	.33415E-14	0.00000	.25331E-13	0.00000	-.24258E-13	0.00000	-.18604E+00	0.00000	-.62371E-01	0.00000
.21112E+00	0.00000	-.55040E-13	0.00000	.12475E-13	0.00000	-.76174E-14	0.00000	-.18604E+00	0.00000	.62371E-01	0.00000
-.22244E-01	0.00000	-.15655E-13	0.00000	.37297E-13	0.00000	-.86833E-14	0.00000	-.23234E-01	0.00000	-.74685E-01	0.00000
.22244E-01	0.00000	-.14304E-13	0.00000	.44444E-13	0.00000	-.76386E-14	0.00000	-.23234E-01	0.00000	.74685E-01	0.00000
.16489E+00	0.00000	.27846E-13	0.00000	.64460E-13	0.00000	-.89890E-14	0.00000	.14772E+00	0.00000	-.47903E-01	0.00000
-.16489E+00	0.00000	-.45215E-13	0.00000	.63479E-13	0.00000	-.45864E-14	0.00000	.14772E+00	0.00000	.47903E-01	0.00000
.21900E+00	0.00000	.20746E-14	0.00000	.22753E-13	0.00000	-.30936E-13	0.00000	.19750E+00	0.00000	.13029E-01	0.00000
-.21900E+00	0.00000	-.30605E-13	0.00000	.19595E-13	0.00000	-.29377E-13	0.00000	.19750E+00	0.00000	-.13029E-01	0.00000
.99257E-01	0.00000	.71066E-14	0.00000	-.39228E-13	0.00000	-.25849E-13	0.00000	.89591E-01	0.00000	.63186E-01	0.00000
-.99257E-01	0.00000	-.25563E-13	0.00000	-.39252E-13	0.00000	-.24104E-13	0.00000	.89591E-01	0.00000	-.63186E-01	0.00000
-.99257E-01	0.00000	.52354E-14	0.00000	-.49011E-13	0.00000	.62533E-14	0.00000	-.89591E-01	0.00000	.63186E-01	0.00000
.99257E-01	0.00000	-.46014E-14	0.00000	-.48997E-13	0.00000	.84328E-14	0.00000	-.89591E-01	0.00000	-.63186E-01	0.00000
-.21900E+00	0.00000	.54363E-14	0.00000	-.18036E-14	0.00000	.17802E-13	0.00000	-.19750E+00	0.00000	.13029E-01	0.00000
.21900E+00	0.00000	-.18632E-14	0.00000	-.18721E-14	0.00000	.16382E-13	0.00000	-.19750E+00	0.00000	-.13029E-01	0.00000
-.16489E+00	0.00000	.13233E-13	0.00000	.47260E-13	0.00000	-.30302E-14	0.00000	-.14772E+00	0.00000	-.47903E-01	0.00000
.16489E+00	0.00000	.10033E-13	0.00000	.47749E-13	0.00000	.14378E-14	0.00000	-.14772E+00	0.00000	.47903E-01	0.00000
.22244E-01	0.00000	.38687E-13	0.00000	.36941E-13	0.00000	-.10818E-13	0.00000	.23234E-01	0.00000	-.74685E-01	0.00000
-.22244E-01	0.00000	-.11908E-13	0.00000	.36957E-13	0.00000	-.14759E-13	0.00000	.23234E-01	0.00000	.74685E-01	0.00000
.21112E+00	0.00000	.40528E-13	0.00000	-.27290E-13	0.00000	-.33044E-13	0.00000	.18604E+00	0.00000	-.62371E-01	0.00000
-.21112E+00	0.00000	-.46273E-14	0.00000	-.27168E-13	0.00000	-.32946E-13	0.00000	.18604E+00	0.00000	.62371E-01	0.00000

NATURAL FREQUENCY= .418007E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.11954E+00	0.00000	.82508E-14	0.00000	-.50010E-14	0.00000	-.21458E-13	0.00000	-.16011E-12	0.00000	.21902E+00	0.00000
.11954E+00	0.00000	-.41991E-13	0.00000	.13825E-14	0.00000	-.24620E-13	0.00000	-.15566E-12	0.00000	.21902E+00	0.00000
-.23122E+00	0.00000	-.21100E-13	0.00000	.85298E-14	0.00000	-.28839E-13	0.00000	.70825E-13	0.00000	.59140E-01	0.00000
-.23122E+00	0.00000	-.12685E-14	0.00000	-.44846E-15	0.00000	.16375E-13	0.00000	.68611E-13	0.00000	.59140E-01	0.00000
-.93326E-01	0.00000	.22538E-14	0.00000	.15012E-13	0.00000	-.55014E-14	0.00000	.14222E-12	0.00000	-.12921E+00	0.00000
-.93326E-01	0.00000	-.25576E-13	0.00000	.16924E-13	0.00000	.80655E-14	0.00000	.14605E-12	0.00000	-.12921E+00	0.00000
.23541E+00	0.00000	-.18631E-14	0.00000	.22775E-13	0.00000	-.14985E-13	0.00000	-.24262E-13	0.00000	-.75020E-01	0.00000
.23541E+00	0.00000	-.39056E-13	0.00000	.18821E-13	0.00000	-.96941E-14	0.00000	-.71599E-13	0.00000	-.75020E-01	0.00000
.17756E+00	0.00000	-.24730E-13	0.00000	-.50159E-14	0.00000	-.21980E-13	0.00000	-.26882E-12	0.00000	.11441E+00	0.00000
.17756E+00	0.00000	-.18124E-13	0.00000	-.60085E-14	0.00000	-.17802E-13	0.00000	-.26305E-12	0.00000	.11441E+00	0.00000
-.17756E+00	0.00000	.11669E-15	0.00000	-.21989E-13	0.00000	.54532E-14	0.00000	-.14599E-12	0.00000	.11441E+00	0.00000
-.17756E+00	0.00000	-.24611E-13	0.00000	-.22255E-13	0.00000	.21797E-14	0.00000	-.15372E-12	0.00000	.11441E+00	0.00000
-.23541E+00	0.00000	.19667E-13	0.00000	-.12549E-13	0.00000	.21994E-13	0.00000	.24419E-12	0.00000	-.75020E-01	0.00000
-.23541E+00	0.00000	-.12621E-13	0.00000	-.11824E-13	0.00000	.16280E-13	0.00000	.23323E-12	0.00000	-.75020E-01	0.00000
.93326E-01	0.00000	.86537E-14	0.00000	.14376E-13	0.00000	-.55867E-14	0.00000	.39223E-12	0.00000	-.12921E+00	0.00000
.93326E-01	0.00000	.17296E-13	0.00000	.13083E-13	0.00000	-.76265E-14	0.00000	.39870E-12	0.00000	-.12921E+00	0.00000
.23122E+00	0.00000	.40877E-13	0.00000	.19789E-13	0.00000	-.13874E-13	0.00000	.90377E-13	0.00000	.59140E-01	0.00000
.23122E+00	0.00000	.66221E-14	0.00000	.19924E-13	0.00000	-.11579E-13	0.00000	.88194E-13	0.00000	.59140E-01	0.00000
-.11954E+00	0.00000	.37548E-13	0.00000	-.54704E-14	0.00000	-.13436E-13	0.00000	-.37886E-12	0.00000	.21902E+00	0.00000
-.11954E+00	0.00000	.18830E-13	0.00000	-.54995E-14	0.00000	-.14393E-13	0.00000	-.38051E-12	0.00000	.21902E+00	0.00000

TX REAL	TX IMAG.	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.18918E+00	0.00000	-.41291E-11	0.00000	-.15314E-11	0.00000	.45775E-11	0.00000	.15570E+00	0.00000	.10098E+00	0.00000
-.18918E+00	0.00000	.41075E-11	0.00000	-.15398E-11	0.00000	.45833E-11	0.00000	.15570E+00	0.00000	-.10098E+00	0.00000
-.92025E-01	0.00000	-.26152E-11	0.00000	.59778E-11	0.00000	.16467E-11	0.00000	-.74324E-01	0.00000	.85806E-01	0.00000
.92025E-01	0.00000	.25857E-11	0.00000	.59988E-11	0.00000	.16293E-11	0.00000	-.74324E-01	0.00000	-.85806E-01	0.00000
-.22194E+00	0.00000	-.11231E-11	0.00000	.20071E-11	0.00000	-.18291E-11	0.00000	-.18945E+00	0.00000	-.72055E-02	0.00000
.22194E+00	0.00000	.10655E-11	0.00000	.20001E-11	0.00000	-.18362E-11	0.00000	-.18945E+00	0.00000	.72055E-02	0.00000
-.57420E-01	0.00000	-.11563E-11	0.00000	-.60931E-11	0.00000	-.76936E-12	0.00000	-.49098E-01	0.00000	-.84289E-01	0.00000
.57420E-01	0.00000	.11044E-11	0.00000	-.60890E-11	0.00000	-.77078E-12	0.00000	-.49098E-01	0.00000	.84289E-01	0.00000
.18221E+00	0.00000	-.21430E-11	0.00000	-.44459E-11	0.00000	.27263E-11	0.00000	.15718E+00	0.00000	-.49977E-01	0.00000
-.18221E+00	0.00000	.21021E-11	0.00000	-.44453E-11	0.00000	.27224E-11	0.00000	.15718E+00	0.00000	.49977E-01	0.00000
.18221E+00	0.00000	-.21421E-11	0.00000	.44678E-11	0.00000	.27107E-11	0.00000	.15718E+00	0.00000	.49977E-01	0.00000
-.18221E+00	0.00000	.20955E-11	0.00000	.44670E-11	0.00000	.27052E-11	0.00000	.15718E+00	0.00000	-.49977E-01	0.00000
-.57420E-01	0.00000	-.11419E-11	0.00000	.60668E-11	0.00000	-.78605E-12	0.00000	-.49098E-01	0.00000	.84289E-01	0.00000
.57420E-01	0.00000	.11265E-11	0.00000	.60624E-11	0.00000	-.78320E-12	0.00000	-.49098E-01	0.00000	-.84289E-01	0.00000
-.22194E+00	0.00000	-.10687E-11	0.00000	-.20469E-11	0.00000	-.18134E-11	0.00000	-.18945E+00	0.00000	.72055E-02	0.00000
.22194E+00	0.00000	.10880E-11	0.00000	-.20477E-11	0.00000	-.18138E-11	0.00000	-.18945E+00	0.00000	-.72055E-02	0.00000
-.92025E-01	0.00000	-.26229E-11	0.00000	-.59993E-11	0.00000	.16402E-11	0.00000	-.74324E-01	0.00000	-.85806E-01	0.00000
.92025E-01	0.00000	.26660E-11	0.00000	-.59990E-11	0.00000	.16499E-11	0.00000	-.74324E-01	0.00000	.85806E-01	0.00000
.18918E+00	0.00000	-.40923E-11	0.00000	.15932E-11	0.00000	.46059E-11	0.00000	.15570E+00	0.00000	-.10098E+00	0.00000
-.18918E+00	0.00000	.41558E-11	0.00000	.15923E-11	0.00000	.46048E-11	0.00000	.15570E+00	0.00000	.10098E+00	0.00000

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NATURAL FREQUENCY= .495598E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.69314E-11	0.00000	-.16056E+00	0.00000	-.61141E-01	0.00000	.17935E+00	0.00000	.56708E-11	0.00000	.37218E-11	0.00000
-.69111E-11	0.00000	.16056E+00	0.00000	-.61141E-01	0.00000	.17935E+00	0.00000	.57047E-11	0.00000	-.36610E-11	0.00000
-.33953E-11	0.00000	-.10285E+00	0.00000	.23406E+00	0.00000	.63659E-01	0.00000	-.27461E-11	0.00000	.31563E-11	0.00000
.33638E-11	0.00000	.10285E+00	0.00000	.23406E+00	0.00000	.63659E-01	0.00000	-.27256E-11	0.00000	-.31179E-11	0.00000
-.81909E-11	0.00000	-.42019E-01	0.00000	.79057E-01	0.00000	-.71042E-01	0.00000	-.69431E-11	0.00000	-.25827E-12	0.00000
.80850E-11	0.00000	.42019E-01	0.00000	.79057E-01	0.00000	-.71042E-01	0.00000	-.69350E-11	0.00000	.26381E-12	0.00000
-.20997E-11	0.00000	-.44061E-01	0.00000	-.23732E+00	0.00000	-.30226E-01	0.00000	-.17913E-11	0.00000	-.31663E-11	0.00000
.21051E-11	0.00000	.44061E-01	0.00000	-.23732E+00	0.00000	-.30226E-01	0.00000	-.17868E-11	0.00000	.30572E-11	0.00000
.67996E-11	0.00000	-.82771E-01	0.00000	-.17405E+00	0.00000	.10601E+00	0.00000	.57586E-11	0.00000	-.18330E-11	0.00000
-.66289E-11	0.00000	.82771E-01	0.00000	-.17405E+00	0.00000	.10601E+00	0.00000	.57629E-11	0.00000	.18393E-11	0.00000
.66700E-11	0.00000	-.82771E-01	0.00000	.17405E+00	0.00000	.10601E+00	0.00000	.57553E-11	0.00000	.18925E-11	0.00000
-.66572E-11	0.00000	.82771E-01	0.00000	.17405E+00	0.00000	.10601E+00	0.00000	.57595E-11	0.00000	-.18121E-11	0.00000
-.21794E-11	0.00000	-.44061E-01	0.00000	.23732E+00	0.00000	-.30226E-01	0.00000	-.18172E-11	0.00000	.30917E-11	0.00000
.20730E-11	0.00000	.44061E-01	0.00000	.23732E+00	0.00000	-.30226E-01	0.00000	-.18076E-11	0.00000	-.31055E-11	0.00000
-.81365E-11	0.00000	-.42019E-01	0.00000	-.79057E-01	0.00000	-.71042E-01	0.00000	-.69674E-11	0.00000	.26126E-12	0.00000
.81444E-11	0.00000	.42019E-01	0.00000	-.79057E-01	0.00000	-.71042E-01	0.00000	-.69743E-11	0.00000	-.28948E-12	0.00000
-.33652E-11	0.00000	-.10285E+00	0.00000	-.23406E+00	0.00000	.63659E-01	0.00000	-.27278E-11	0.00000	-.31434E-11	0.00000
.34139E-11	0.00000	.10285E+00	0.00000	-.23406E+00	0.00000	.63659E-01	0.00000	-.27350E-11	0.00000	.32028E-11	0.00000
.69288E-11	0.00000	-.16056E+00	0.00000	.61141E-01	0.00000	.17935E+00	0.00000	.57310E-11	0.00000	-.36880E-11	0.00000
-.69411E-11	0.00000	.16056E+00	0.00000	.61141E-01	0.00000	.17935E+00	0.00000	.57268E-11	0.00000	.37336E-11	0.00000

NATURAL FREQUENCY= .568725E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.66049E-01	0.00000	-.75792E-13	0.00000	.80918E-14	0.00000	.17149E-13	0.00000	.11085E-12	0.00000	-.23699E+00	0.00000
-.66049E-01	0.00000	-.18360E-13	0.00000	-.14487E-13	0.00000	.95541E-15	0.00000	.11938E-12	0.00000	-.23699E+00	0.00000
.23248E+00	0.00000	-.30219E-13	0.00000	-.30825E-13	0.00000	-.13245E-13	0.00000	-.14074E-12	0.00000	.12711E-01	0.00000
.23248E+00	0.00000	-.10647E-13	0.00000	-.25075E-13	0.00000	-.86196E-14	0.00000	-.13651E-12	0.00000	.12711E-01	0.00000
-.10842E+00	0.00000	-.33819E-13	0.00000	-.55445E-13	0.00000	.41618E-13	0.00000	-.14174E-12	0.00000	.14108E+00	0.00000
-.10842E+00	0.00000	.54817E-13	0.00000	-.64517E-13	0.00000	.13983E-13	0.00000	-.12738E-12	0.00000	.14108E+00	0.00000
-.22921E+00	0.00000	.79019E-15	0.00000	-.53867E-14	0.00000	.24705E-13	0.00000	.78784E-13	0.00000	-.85515E-01	0.00000
-.22921E+00	0.00000	.75707E-13	0.00000	-.21932E-15	0.00000	.30541E-13	0.00000	.84806E-13	0.00000	-.85515E-01	0.00000
.17120E+00	0.00000	.42292E-13	0.00000	.66158E-13	0.00000	.12763E-13	0.00000	.13556E-12	0.00000	-.12243E+00	0.00000
.17120E+00	0.00000	.69154E-13	0.00000	.58088E-13	0.00000	.10338E-13	0.00000	.12633E-12	0.00000	-.12243E+00	0.00000
.17120E+00	0.00000	.46983E-13	0.00000	-.23333E-14	0.00000	-.14270E-13	0.00000	-.33471E-13	0.00000	.12243E+00	0.00000
.17120E+00	0.00000	.41758E-13	0.00000	.46509E-16	0.00000	-.18062E-13	0.00000	-.31288E-13	0.00000	.12243E+00	0.00000
-.22921E+00	0.00000	.19574E-13	0.00000	-.65698E-13	0.00000	-.93640E-14	0.00000	-.13301E-12	0.00000	.85515E-01	0.00000
-.22921E+00	0.00000	.33765E-13	0.00000	-.66713E-13	0.00000	-.10206E-13	0.00000	-.13355E-12	0.00000	.85515E-01	0.00000
-.10842E+00	0.00000	-.28790E-13	0.00000	-.15388E-13	0.00000	.21206E-13	0.00000	.68054E-13	0.00000	-.14108E+00	0.00000
-.10842E+00	0.00000	-.15160E-13	0.00000	-.13952E-13	0.00000	.15738E-13	0.00000	.69091E-13	0.00000	-.14108E+00	0.00000
.23248E+00	0.00000	-.17603E-13	0.00000	.39843E-13	0.00000	.12698E-14	0.00000	.10932E-12	0.00000	-.12711E-01	0.00000
.23248E+00	0.00000	-.66447E-13	0.00000	.45332E-13	0.00000	.14195E-13	0.00000	.11447E-12	0.00000	-.12711E-01	0.00000
-.66049E-01	0.00000	-.51584E-13	0.00000	-.24372E-14	0.00000	-.31818E-13	0.00000	-.10381E-12	0.00000	.23699E+00	0.00000
-.66049E-01	0.00000	-.88388E-13	0.00000	-.21071E-14	0.00000	-.31471E-13	0.00000	-.10033E-12	0.00000	.23699E+00	0.00000

NATURAL FREQUENCY= .576674E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.35001E-13	0.00000	-.30075E+00	0.00000	.40480E-14	0.00000	-.17502E-13	0.00000	-.37113E-13	0.00000	-.78438E-13	0.00000
-.39132E-13	0.00000	-.30075E+00	0.00000	-.11539E-13	0.00000	-.16918E-13	0.00000	-.51692E-13	0.00000	-.70821E-14	0.00000
.64270E-13	0.00000	-.18587E+00	0.00000	-.34486E-13	0.00000	-.93314E-14	0.00000	.20870E-13	0.00000	.89505E-15	0.00000
-.10950E-13	0.00000	-.18587E+00	0.00000	-.19273E-13	0.00000	.19919E-13	0.00000	.20573E-13	0.00000	.36994E-13	0.00000
-.33014E-13	0.00000	-.83930E-13	0.00000	.10919E-12	0.00000	.49780E-13	0.00000	.16442E-13	0.00000	.17354E-13	0.00000
-.55507E-13	0.00000	-.66613E-13	0.00000	.11308E-12	0.00000	.36239E-13	0.00000	.10716E-13	0.00000	-.17141E-13	0.00000
-.12292E-13	0.00000	.18587E+00	0.00000	.14707E-12	0.00000	-.42800E-13	0.00000	-.29337E-13	0.00000	-.20384E-13	0.00000
.25658E-13	0.00000	.18587E+00	0.00000	.15299E-12	0.00000	-.13599E-13	0.00000	-.45216E-13	0.00000	-.33356E-13	0.00000
.32326E-14	0.00000	.30075E+00	0.00000	-.33061E-13	0.00000	-.48457E-13	0.00000	-.18358E-13	0.00000	.33959E-13	0.00000
.23939E-13	0.00000	.30075E+00	0.00000	-.56084E-13	0.00000	-.75340E-13	0.00000	.24779E-14	0.00000	.16343E-13	0.00000
.49469E-14	0.00000	.30075E+00	0.00000	-.14479E-12	0.00000	.25655E-13	0.00000	.24711E-13	0.00000	-.58949E-14	0.00000
-.15207E-13	0.00000	.30075E+00	0.00000	-.14583E-12	0.00000	.17178E-14	0.00000	-.71917E-14	0.00000	.27421E-14	0.00000
.88490E-14	0.00000	.18587E+00	0.00000	-.40050E-13	0.00000	.29839E-13	0.00000	-.81821E-14	0.00000	.22806E-13	0.00000
-.28467E-13	0.00000	.18587E+00	0.00000	-.61118E-13	0.00000	.38701E-13	0.00000	-.68843E-14	0.00000	.27044E-14	0.00000
-.45297E-13	0.00000	.73154E-13	0.00000	.55174E-13	0.00000	.71002E-14	0.00000	-.12557E-13	0.00000	.74681E-14	0.00000
-.55255E-14	0.00000	.28032E-13	0.00000	.86224E-13	0.00000	.14571E-13	0.00000	-.72056E-14	0.00000	-.36640E-13	0.00000
-.14125E-13	0.00000	-.18587E+00	0.00000	.77432E-13	0.00000	-.37773E-13	0.00000	-.32263E-13	0.00000	-.97273E-14	0.00000
.68442E-13	0.00000	-.18587E+00	0.00000	.73575E-13	0.00000	-.31479E-13	0.00000	-.34164E-13	0.00000	-.21040E-13	0.00000
.25568E-14	0.00000	-.30075E+00	0.00000	-.17445E-13	0.00000	-.54107E-13	0.00000	.14145E-13	0.00000	.41191E-13	0.00000
-.35784E-13	0.00000	-.30075E+00	0.00000	-.11392E-13	0.00000	-.61166E-13	0.00000	.70586E-14	0.00000	.79891E-13	0.00000

NATURAL FREQUENCY= .617710E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.79736E-12	0.00000	-.21410E+00	0.00000	.47452E-01	0.00000	.18049E+00	0.00000	.61259E-12	0.00000	.72338E-12	0.00000
.71616E-12	0.00000	.21410E+00	0.00000	.47452E-01	0.00000	.18049E+00	0.00000	.56489E-12	0.00000	-.60539E-12	0.00000
.95538E-12	0.00000	-.14248E+00	0.00000	.18305E+00	0.00000	.18036E-01	0.00000	-.68442E-12	0.00000	.34517E-12	0.00000
.83059E-12	0.00000	.14248E+00	0.00000	.18305E+00	0.00000	.18036E-01	0.00000	-.72377E-12	0.00000	-.31022E-12	0.00000
.70926E-12	0.00000	-.90667E-01	0.00000	-.14614E+00	0.00000	-.41527E-01	0.00000	-.55002E-12	0.00000	-.42120E-12	0.00000
.69079E-12	0.00000	.90667E-01	0.00000	-.14614E+00	0.00000	-.41527E-01	0.00000	-.58605E-12	0.00000	.33442E-12	0.00000
.93341E-12	0.00000	-.86487E-01	0.00000	-.21237E+00	0.00000	.87174E-01	0.00000	.71887E-12	0.00000	-.33333E-12	0.00000
.74941E-12	0.00000	.86487E-01	0.00000	-.21237E+00	0.00000	.87174E-01	0.00000	.72053E-12	0.00000	.33922E-12	0.00000
.76817E-12	0.00000	-.43949E-01	0.00000	.12801E+00	0.00000	.83439E-01	0.00000	.63956E-12	0.00000	.42379E-12	0.00000
.86558E-12	0.00000	.43949E-01	0.00000	.12801E+00	0.00000	.83439E-01	0.00000	.65247E-12	0.00000	-.31855E-12	0.00000
.89214E-12	0.00000	.43949E-01	0.00000	.12801E+00	0.00000	-.83439E-01	0.00000	-.67020E-12	0.00000	.35903E-12	0.00000
.75084E-12	0.00000	-.43949E-01	0.00000	.12801E+00	0.00000	-.83439E-01	0.00000	-.67887E-12	0.00000	-.44277E-12	0.00000
.82336E-12	0.00000	.86487E-01	0.00000	-.21237E+00	0.00000	-.87174E-01	0.00000	-.75727E-12	0.00000	-.39635E-12	0.00000
.10117E-11	0.00000	-.86487E-01	0.00000	-.21237E+00	0.00000	-.87174E-01	0.00000	-.77086E-12	0.00000	.29137E-12	0.00000
.77897E-12	0.00000	.90667E-01	0.00000	-.14614E+00	0.00000	.41527E-01	0.00000	.58723E-12	0.00000	-.35465E-12	0.00000
.68291E-12	0.00000	-.90667E-01	0.00000	-.14614E+00	0.00000	.41527E-01	0.00000	.56253E-12	0.00000	.46989E-12	0.00000
.66747E-12	0.00000	.14248E+00	0.00000	.18305E+00	0.00000	-.18036E-01	0.00000	.78887E-12	0.00000	.33071E-12	0.00000
.10332E-11	0.00000	-.14248E+00	0.00000	.18305E+00	0.00000	-.18036E-01	0.00000	.76049E-12	0.00000	-.31014E-12	0.00000
.77468E-12	0.00000	.21410E+00	0.00000	.47452E-01	0.00000	-.18049E+00	0.00000	-.59320E-12	0.00000	.61162E-12	0.00000
.87103E-12	0.00000	-.21410E+00	0.00000	.47452E-01	0.00000	-.18049E+00	0.00000	-.62859E-12	0.00000	-.81233E-12	0.00000

NATURAL FREQUENCY= .618714E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.15589E+00	0.00000	.66894E-12	0.00000	.52530E-13	0.00000	-.74862E-12	0.00000	-.11979E+00	0.00000	-.13635E+00	0.00000
.15589E+00	0.00000	-.73242E-12	0.00000	.66391E-13	0.00000	-.75270E-12	0.00000	-.11979E+00	0.00000	.13635E+00	0.00000
.18084E+00	0.00000	.33566E-12	0.00000	-.87326E-12	0.00000	-.80199E-13	0.00000	.14421E+00	0.00000	-.65166E-01	0.00000
.18084E+00	0.00000	-.40645E-12	0.00000	-.85371E-12	0.00000	-.80340E-13	0.00000	.14421E+00	0.00000	.65166E-01	0.00000
.13570E+00	0.00000	.11633E-12	0.00000	.43809E-12	0.00000	.32557E-12	0.00000	.11062E+00	0.00000	.78150E-01	0.00000
.13570E+00	0.00000	-.10820E-12	0.00000	.44107E-12	0.00000	.33360E-12	0.00000	.11062E+00	0.00000	-.78150E-01	0.00000
.16947E+00	0.00000	.52116E-13	0.00000	.10207E-11	0.00000	-.18602E-12	0.00000	-.14233E+00	0.00000	.64480E-01	0.00000
.16947E+00	0.00000	-.62025E-13	0.00000	.10157E-11	0.00000	-.18733E-12	0.00000	-.14233E+00	0.00000	-.64480E-01	0.00000
.15327E+00	0.00000	-.39388E-13	0.00000	-.37818E-12	0.00000	-.29172E-12	0.00000	-.12823E+00	0.00000	-.72016E-01	0.00000
.15327E+00	0.00000	.12438E-12	0.00000	-.38320E-12	0.00000	-.28862E-12	0.00000	-.12823E+00	0.00000	.72016E-01	0.00000
.15327E+00	0.00000	-.44258E-12	0.00000	-.66026E-12	0.00000	.39586E-12	0.00000	.12823E+00	0.00000	-.72016E-01	0.00000
.15327E+00	0.00000	.49289E-12	0.00000	-.65800E-12	0.00000	.39445E-12	0.00000	.12823E+00	0.00000	.72016E-01	0.00000
.16947E+00	0.00000	-.59728E-12	0.00000	.78741E-12	0.00000	.53265E-12	0.00000	.14233E+00	0.00000	.64480E-01	0.00000
.16947E+00	0.00000	.68193E-12	0.00000	.78484E-12	0.00000	.53339E-12	0.00000	.14233E+00	0.00000	-.64480E-01	0.00000
.13570E+00	0.00000	-.64241E-12	0.00000	.74338E-12	0.00000	-.52782E-13	0.00000	-.11062E+00	0.00000	.78150E-01	0.00000
.13570E+00	0.00000	.63353E-12	0.00000	.74461E-12	0.00000	-.49542E-13	0.00000	-.11062E+00	0.00000	-.78150E-01	0.00000
.18084E+00	0.00000	-.82180E-12	0.00000	-.74563E-12	0.00000	.82303E-13	0.00000	-.14421E+00	0.00000	-.65166E-01	0.00000
.18084E+00	0.00000	.79316E-12	0.00000	-.74526E-12	0.00000	.74286E-13	0.00000	-.14421E+00	0.00000	.65166E-01	0.00000
.15589E+00	0.00000	-.11268E-11	0.00000	-.41158E-12	0.00000	.80097E-12	0.00000	.11979E+00	0.00000	-.13635E+00	0.00000
.15589E+00	0.00000	.10459E-11	0.00000	-.41135E-12	0.00000	.79875E-12	0.00000	.11979E+00	0.00000	.13635E+00	0.00000

NATURAL FREQUENCY= .623158E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.93417E-13	0.00000	-.13091E+00	0.00000	.16864E+00	0.00000	.17758E-01	0.00000	-.12560E-12	0.00000	-.19532E-13	0.00000
.13391E-12	0.00000	.13091E+00	0.00000	.16864E+00	0.00000	.17758E-01	0.00000	-.94406E-13	0.00000	.15451E-12	0.00000
.94634E-13	0.00000	-.14730E+00	0.00000	-.37993E-01	0.00000	.32249E-02	0.00000	.91766E-13	0.00000	-.34162E-13	0.00000
.18968E-12	0.00000	.14730E+00	0.00000	-.37993E-01	0.00000	.32249E-02	0.00000	.13262E-12	0.00000	.44313E-13	0.00000
.11369E-12	0.00000	-.19322E+00	0.00000	-.11049E+00	0.00000	.10062E+00	0.00000	.82666E-13	0.00000	.47874E-13	0.00000
.65344E-13	0.00000	.19322E+00	0.00000	-.11049E+00	0.00000	.10062E+00	0.00000	.10040E-12	0.00000	-.80901E-13	0.00000
.61672E-13	0.00000	-.21416E+00	0.00000	.89365E-01	0.00000	.12645E+00	0.00000	-.10477E-12	0.00000	.49897E-13	0.00000
.15815E-12	0.00000	.21416E+00	0.00000	.89365E-01	0.00000	.12645E+00	0.00000	-.74514E-13	0.00000	-.60362E-14	0.00000
.13407E-12	0.00000	-.19755E+00	0.00000	.10708E+00	0.00000	.39098E-01	0.00000	-.90419E-13	0.00000	-.34525E-13	0.00000
.37838E-13	0.00000	.19755E+00	0.00000	.10708E+00	0.00000	.39098E-01	0.00000	-.92101E-13	0.00000	.82506E-13	0.00000
.89731E-13	0.00000	-.19755E+00	0.00000	-.10708E+00	0.00000	.39098E-01	0.00000	.91236E-13	0.00000	-.41370E-13	0.00000
.12264E-12	0.00000	.19755E+00	0.00000	-.10708E+00	0.00000	.39098E-01	0.00000	.85534E-13	0.00000	.15715E-13	0.00000
.94413E-13	0.00000	-.21416E+00	0.00000	-.89365E-01	0.00000	.12645E+00	0.00000	.57219E-13	0.00000	.25611E-13	0.00000
.32894E-13	0.00000	.21416E+00	0.00000	-.89365E-01	0.00000	.12645E+00	0.00000	.66409E-13	0.00000	-.43015E-13	0.00000
.75970E-13	0.00000	-.19322E+00	0.00000	.11049E+00	0.00000	.10062E+00	0.00000	-.60896E-13	0.00000	.84803E-13	0.00000
.95946E-13	0.00000	.19322E+00	0.00000	.11049E+00	0.00000	.10062E+00	0.00000	-.54536E-13	0.00000	-.19425E-13	0.00000
.12907E-12	0.00000	-.14730E+00	0.00000	.37993E-01	0.00000	.32249E-02	0.00000	-.82955E-13	0.00000	-.57860E-13	0.00000
.66777E-13	0.00000	.14730E+00	0.00000	.37993E-01	0.00000	.32249E-02	0.00000	-.73626E-13	0.00000	.52711E-13	0.00000
.11562E-12	0.00000	-.13091E+00	0.00000	-.16864E+00	0.00000	.17758E-01	0.00000	.86095E-13	0.00000	-.12651E-12	0.00000
.65836E-13	0.00000	.13091E+00	0.00000	-.16864E+00	0.00000	.17758E-01	0.00000	.99251E-13	0.00000	.26977E-13	0.00000

NATURAL FREQUENCY= .71)277E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.19230E-01	0.00000	.77156E-14	0.00000	-.89938E-13	0.00000	.14800E-13	0.00000	-.36053E-13	0.00000	.24607E+00	0.00000
.19230E-01	0.00000	-.47786E-13	0.00000	-.63083E-13	0.00000	.34904E-13	0.00000	-.25252E-13	0.00000	.24607E+00	0.00000
-.18076E+00	0.00000	.10420E-13	0.00000	.80617E-13	0.00000	-.74938E-14	0.00000	-.55058E-13	0.00000	-.80657E-01	0.00000
-.18076E+00	0.00000	-.19851E-15	0.00000	.76794E-13	0.00000	.49804E-13	0.00000	-.83598E-13	0.00000	-.80657E-01	0.00000
.24821E+00	0.00000	.24965E-13	0.00000	.40622E-13	0.00000	-.45912E-13	0.00000	.61637E-13	0.00000	-.57847E-01	0.00000
.24821E+00	0.00000	-.22227E-13	0.00000	.31707E-13	0.00000	-.50290E-14	0.00000	.17324E-14	0.00000	-.57847E-01	0.00000
-.16962E-01	0.00000	.18525E-13	0.00000	-.69876E-13	0.00000	.79298E-14	0.00000	.77559E-13	0.00000	.16715E+00	0.00000
-.16962E-01	0.00000	.46851E-13	0.00000	-.78184E-13	0.00000	-.32578E-14	0.00000	.56123E-13	0.00000	.16715E+00	0.00000
-.22418E+00	0.00000	-.86136E-14	0.00000	-.16382E-13	0.00000	.37304E-13	0.00000	-.64071E-13	0.00000	-.85300E-01	0.00000
-.22418E+00	0.00000	.10045E-12	0.00000	-.11985E-13	0.00000	.46097E-13	0.00000	-.62227E-13	0.00000	-.85300E-01	0.00000
.22418E+00	0.00000	.11999E-13	0.00000	.54398E-13	0.00000	.18590E-13	0.00000	-.62127E-14	0.00000	-.85300E-01	0.00000
.22418E+00	0.00000	.96971E-13	0.00000	.47589E-13	0.00000	.90740E-14	0.00000	-.40718E-14	0.00000	-.85300E-01	0.00000
.16962E-01	0.00000	-.17622E-13	0.00000	-.22940E-13	0.00000	-.12489E-13	0.00000	.71103E-13	0.00000	.16715E+00	0.00000
.16962E-01	0.00000	.94807E-13	0.00000	-.20365E-13	0.00000	.14261E-14	0.00000	.80844E-13	0.00000	.16715E+00	0.00000
-.24821E+00	0.00000	-.48554E-13	0.00000	-.13136E-13	0.00000	.33782E-13	0.00000	-.16309E-13	0.00000	-.57847E-01	0.00000
-.24821E+00	0.00000	.31014E-13	0.00000	-.22405E-13	0.00000	.29559E-13	0.00000	-.19819E-13	0.00000	-.57847E-01	0.00000
.18076E+00	0.00000	-.70492E-13	0.00000	.35286E-13	0.00000	.20128E-13	0.00000	-.52292E-13	0.00000	-.80657E-01	0.00000
.18076E+00	0.00000	-.14168E-13	0.00000	.35236E-13	0.00000	-.16441E-15	0.00000	-.62804E-13	0.00000	-.80657E-01	0.00000
-.19230E-01	0.00000	-.76909E-13	0.00000	-.34628E-13	0.00000	-.19468E-13	0.00000	.49783E-13	0.00000	.24607E+00	0.00000
-.19230E-01	0.00000	-.42985E-13	0.00000	-.33196E-13	0.00000	-.16454E-13	0.00000	.50553E-13	0.00000	.24607E+00	0.00000

NATURAL FREQUENCY= .735407E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.10152E-12	0.00000	.14640E+00	0.00000	-.19551E+00	0.00000	.28985E-01	0.00000	-.97968E-13	0.00000	-.18962E-12	0.00000
.10914E-12	0.00000	-.14640E+00	0.00000	-.19551E+00	0.00000	.28985E-01	0.00000	-.65144E-13	0.00000	.12432E-12	0.00000
.23744E-12	0.00000	.17138E+00	0.00000	.17738E+00	0.00000	-.23611E-01	0.00000	.15908E-12	0.00000	-.59787E-16	0.00000
-.18059E-12	0.00000	-.17138E+00	0.00000	.17738E+00	0.00000	-.23611E-01	0.00000	.17536E-12	0.00000	.36652E-13	0.00000
-.71940E-13	0.00000	.18756E+00	0.00000	.35832E-01	0.00000	-.15202E+00	0.00000	-.32940E-13	0.00000	.97522E-13	0.00000
-.21692E-13	0.00000	-.18756E+00	0.00000	.35832E-01	0.00000	-.15202E+00	0.00000	-.16231E-13	0.00000	-.97425E-13	0.00000
-.19921E-12	0.00000	.11072E+00	0.00000	-.17137E+00	0.00000	-.21916E-01	0.00000	-.18100E-12	0.00000	-.75963E-13	0.00000
.22292E-12	0.00000	-.11072E+00	0.00000	-.17137E+00	0.00000	-.21916E-01	0.00000	-.15701E-12	0.00000	-.20705E-14	0.00000
.17200E-12	0.00000	.23793E-01	0.00000	.15367E+00	0.00000	.58092E-01	0.00000	.90916E-13	0.00000	-.80338E-13	0.00000
-.63646E-13	0.00000	-.23793E-01	0.00000	.15367E+00	0.00000	.58092E-01	0.00000	.12154E-12	0.00000	.98624E-13	0.00000
.14164E-12	0.00000	-.23793E-01	0.00000	.15367E+00	0.00000	-.58092E-01	0.00000	.10327E-12	0.00000	.64006E-13	0.00000
-.17966E-12	0.00000	.23793E-01	0.00000	.15367E+00	0.00000	-.58092E-01	0.00000	.12102E-12	0.00000	-.66178E-13	0.00000
-.21207E-12	0.00000	-.11072E+00	0.00000	-.17137E+00	0.00000	.21916E-01	0.00000	-.17425E-12	0.00000	.25646E-13	0.00000
.20783E-12	0.00000	.11072E+00	0.00000	-.17137E+00	0.00000	.21916E-01	0.00000	-.16674E-12	0.00000	-.65913E-13	0.00000
-.23693E-14	0.00000	-.18756E+00	0.00000	.35832E-01	0.00000	.15202E+00	0.00000	-.56138E-13	0.00000	-.11434E-12	0.00000
.64279E-13	0.00000	.18756E+00	0.00000	.35832E-01	0.00000	.15202E+00	0.00000	-.44831E-13	0.00000	.11040E-12	0.00000
.21876E-12	0.00000	-.17138E+00	0.00000	.17738E+00	0.00000	.23611E-01	0.00000	.19133E-12	0.00000	.24213E-13	0.00000
-.22524E-12	0.00000	.17138E+00	0.00000	.17738E+00	0.00000	.23611E-01	0.00000	.19272E-12	0.00000	-.12844E-13	0.00000
-.12433E-12	0.00000	-.14640E+00	0.00000	-.19551E+00	0.00000	-.28985E-01	0.00000	-.94302E-13	0.00000	.17726E-12	0.00000
.14840E-12	0.00000	.14640E+00	0.00000	-.19551E+00	0.00000	-.28985E-01	0.00000	-.88158E-13	0.00000	-.18581E-12	0.00000

NATURAL FREQUENCY= .741646E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.11658E+00	0.00000	-.40570E-13	0.00000	.10037E-12	0.00000	-.27944E-13	0.00000	-.82744E-01	0.00000	-.16122E+00	0.00000
.11658E+00	0.00000	.87697E-13	0.00000	.10754E-12	0.00000	-.12711E-13	0.00000	-.82744E-01	0.00000	.16122E+00	0.00000
.21957E+00	0.00000	-.66647E-13	0.00000	-.90432E-13	0.00000	.60836E-14	0.00000	.17337E+00	0.00000	-.19733E-01	0.00000
-.21957E+00	0.00000	.10596E-12	0.00000	-.13547E-12	0.00000	.16385E-13	0.00000	.17337E+00	0.00000	.19733E-01	0.00000
-.36280E-01	0.00000	-.71109E-13	0.00000	-.77551E-14	0.00000	.11297E-12	0.00000	-.34077E-01	0.00000	.10342E+00	0.00000
.36280E-01	0.00000	.92849E-13	0.00000	-.28888E-13	0.00000	.61996E-13	0.00000	-.34077E-01	0.00000	-.10342E+00	0.00000
-.20446E+00	0.00000	-.44803E-13	0.00000	.10441E-12	0.00000	.26930E-17	0.00000	-.17076E+00	0.00000	-.42456E-01	0.00000
.20446E+00	0.00000	.34483E-13	0.00000	.13957E-12	0.00000	-.35267E-14	0.00000	-.17076E+00	0.00000	.42456E-01	0.00000
.13775E+00	0.00000	-.11934E-14	0.00000	-.12600E-12	0.00000	-.68873E-13	0.00000	.11421E+00	0.00000	-.83481E-01	0.00000
-.13775E+00	0.00000	-.16587E-13	0.00000	-.13074E-12	0.00000	-.36212E-13	0.00000	.11421E+00	0.00000	.83481E-01	0.00000
.13775E+00	0.00000	.19276E-13	0.00000	-.11639E-12	0.00000	.64424E-13	0.00000	.11421E+00	0.00000	.83481E-01	0.00000
-.13775E+00	0.00000	-.47963E-13	0.00000	-.12303E-12	0.00000	.39573E-13	0.00000	.11421E+00	0.00000	-.83481E-01	0.00000
-.20446E+00	0.00000	.59277E-13	0.00000	.15795E-12	0.00000	-.49407E-14	0.00000	-.17076E+00	0.00000	.42456E-01	0.00000
.20446E+00	0.00000	-.90029E-13	0.00000	.18341E-12	0.00000	-.27959E-13	0.00000	-.17076E+00	0.00000	-.42456E-01	0.00000
-.36280E-01	0.00000	.12213E-12	0.00000	.57430E-14	0.00000	-.12138E-12	0.00000	-.34077E-01	0.00000	-.10342E+00	0.00000
.36280E-01	0.00000	-.13820E-12	0.00000	.86044E-14	0.00000	-.11520E-12	0.00000	-.34077E-01	0.00000	.10342E+00	0.00000
.21957E+00	0.00000	.91055E-13	0.00000	-.17493E-12	0.00000	-.13451E-13	0.00000	.17337E+00	0.00000	.19733E-01	0.00000
-.21957E+00	0.00000	-.10529E-12	0.00000	-.17240E-12	0.00000	-.63747E-14	0.00000	.17337E+00	0.00000	-.19733E-01	0.00000
-.11658E+00	0.00000	.58594E-13	0.00000	.13798E-12	0.00000	.68847E-13	0.00000	-.82744E-01	0.00000	.16122E+00	0.00000
.11658E+00	0.00000	-.61367E-13	0.00000	.13149E-12	0.00000	.64307E-13	0.00000	-.82744E-01	0.00000	-.16122E+00	0.00000

NATURAL FREQUENCY= .780279E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.37231E-15	0.00000	.17355E+00	0.00000	-.16049E-01	0.00000	-.17357E+00	0.00000	.25354E-13	0.00000	.35310E-14	0.00000
-.47587E-13	0.00000	-.17355E+00	0.00000	-.16049E-01	0.00000	-.17357E+00	0.00000	.17392E-13	0.00000	.31200E-13	0.00000
.33772E-14	0.00000	.52174E-01	0.00000	-.12018E+00	0.00000	.35478E-01	0.00000	.79004E-14	0.00000	.23029E-13	0.00000
-.68795E-14	0.00000	-.52174E-01	0.00000	-.12018E+00	0.00000	.35478E-01	0.00000	.22730E-14	0.00000	-.27414E-13	0.00000
.11049E-13	0.00000	-.47755E-01	0.00000	.25282E+00	0.00000	.49242E-01	0.00000	-.23366E-13	0.00000	-.11975E-14	0.00000
.85051E-14	0.00000	.47755E-01	0.00000	.25282E+00	0.00000	.49242E-01	0.00000	-.61997E-14	0.00000	.85687E-14	0.00000
.42026E-13	0.00000	-.11331E+00	0.00000	.11230E-01	0.00000	-.44104E-01	0.00000	.92561E-14	0.00000	.30309E-13	0.00000
.34518E-15	0.00000	.11331E+00	0.00000	.11230E-01	0.00000	-.44104E-01	0.00000	.10806E-13	0.00000	.64181E-14	0.00000
.90786E-14	0.00000	-.20366E+00	0.00000	-.17848E+00	0.00000	.12488E+00	0.00000	-.83861E-14	0.00000	.18335E-14	0.00000
.15624E-14	0.00000	.20366E+00	0.00000	-.17848E+00	0.00000	.12488E+00	0.00000	.32791E-13	0.00000	.10810E-14	0.00000
-.25125E-13	0.00000	-.20366E+00	0.00000	.17848E+00	0.00000	.12488E+00	0.00000	-.23025E-13	0.00000	.17990E-14	0.00000
-.24989E-13	0.00000	.20366E+00	0.00000	.17848E+00	0.00000	.12488E+00	0.00000	-.18403E-13	0.00000	-.27318E-14	0.00000
-.53371E-14	0.00000	-.11331E+00	0.00000	-.11230E-01	0.00000	-.44104E-01	0.00000	-.10649E-13	0.00000	-.34070E-14	0.00000
-.35139E-14	0.00000	.11331E+00	0.00000	-.11230E-01	0.00000	-.44104E-01	0.00000	-.43944E-14	0.00000	.22136E-13	0.00000
-.44021E-14	0.00000	-.47755E-01	0.00000	-.25282E+00	0.00000	.49242E-01	0.00000	.22104E-13	0.00000	-.85962E-14	0.00000
-.44009E-13	0.00000	.47755E-01	0.00000	-.25282E+00	0.00000	.49242E-01	0.00000	.29833E-13	0.00000	-.16864E-13	0.00000
.81799E-14	0.00000	.52174E-01	0.00000	.12018E+00	0.00000	.35478E-01	0.00000	-.18505E-13	0.00000	.20123E-13	0.00000
.29100E-14	0.00000	-.52174E-01	0.00000	.12018E+00	0.00000	.35478E-01	0.00000	-.19932E-13	0.00000	-.25503E-13	0.00000
-.18014E-14	0.00000	.17355E+00	0.00000	.16049E-01	0.00000	-.17357E+00	0.00000	-.36213E-13	0.00000	.16014E-13	0.00000
-.15699E-13	0.00000	-.17355E+00	0.00000	.16049E-01	0.00000	-.17357E+00	0.00000	-.23732E-13	0.00000	.23951E-13	0.00000

NATURAL FREQUENCY= .847218E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.58404E-13	0.00000	-.28176E+00	0.00000	.17532E-12	0.00000	.48835E-13	0.00000	.72002E-15	0.00000	-.27545E-12	0.00000
.57561E-13	0.00000	-.28176E+00	0.00000	.16634E-12	0.00000	.67576E-13	0.00000	-.81667E-13	0.00000	-.82556E-13	0.00000
.17954E-12	0.00000	-.49469E-01	0.00000	-.13147E-12	0.00000	.20622E-13	0.00000	.12365E-12	0.00000	.11720E-12	0.00000
-.51883E-13	0.00000	-.49469E-01	0.00000	-.13585E-12	0.00000	.29838E-13	0.00000	.81058E-13	0.00000	.10631E-12	0.00000
-.32095E-12	0.00000	.22361E+00	0.00000	-.61859E-13	0.00000	.49720E-13	0.00000	-.68374E-13	0.00000	-.39097E-13	0.00000
-.83612E-13	0.00000	.22361E+00	0.00000	-.42183E-13	0.00000	.62121E-13	0.00000	-.88122E-13	0.00000	-.73530E-13	0.00000
.16966E-12	0.00000	.31233E+00	0.00000	.27503E-13	0.00000	-.55451E-13	0.00000	.71960E-14	0.00000	-.10454E-12	0.00000
.20118E-12	0.00000	.31233E+00	0.00000	.42527E-13	0.00000	-.17901E-13	0.00000	-.77674E-13	0.00000	.33759E-14	0.00000
-.17898E-15	0.00000	.14356E+00	0.00000	-.46423E-13	0.00000	-.77793E-13	0.00000	.14719E-12	0.00000	.13914E-12	0.00000
-.21283E-12	0.00000	.14356E+00	0.00000	-.68196E-13	0.00000	-.66892E-13	0.00000	.79858E-13	0.00000	.75815E-13	0.00000
-.18878E-12	0.00000	-.14356E+00	0.00000	.16743E-13	0.00000	-.50452E-13	0.00000	-.54565E-13	0.00000	-.10033E-12	0.00000
.35360E-13	0.00000	-.14356E+00	0.00000	.15853E-13	0.00000	-.67676E-13	0.00000	-.14125E-12	0.00000	-.16785E-12	0.00000
.18870E-12	0.00000	-.31233E+00	0.00000	.48470E-13	0.00000	-.38070E-13	0.00000	.35578E-13	0.00000	.16454E-13	0.00000
.19979E-12	0.00000	-.31233E+00	0.00000	.30308E-13	0.00000	-.44736E-13	0.00000	-.65230E-13	0.00000	.11288E-12	0.00000
-.10330E-12	0.00000	-.22361E+00	0.00000	.10182E-12	0.00000	-.13519E-13	0.00000	.12795E-12	0.00000	.80735E-13	0.00000
-.29832E-12	0.00000	-.22361E+00	0.00000	.98516E-13	0.00000	-.16912E-13	0.00000	.49000E-13	0.00000	-.11335E-13	0.00000
-.23384E-13	0.00000	.49469E-01	0.00000	.43721E-13	0.00000	.60189E-14	0.00000	-.39009E-13	0.00000	-.81501E-13	0.00000
.18285E-12	0.00000	.49469E-01	0.00000	.36422E-13	0.00000	.63606E-14	0.00000	-.93916E-13	0.00000	-.14806E-12	0.00000
.30668E-13	0.00000	.28176E+00	0.00000	-.86800E-13	0.00000	.76941E-13	0.00000	.26176E-13	0.00000	.86584E-13	0.00000
-.31882E-13	0.00000	.28176E+00	0.00000	-.99328E-13	0.00000	.77074E-13	0.00000	-.24669E-13	0.00000	.31110E-12	0.00000

NATURAL FREQUENCY= .859770E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.77737E-01	0.00000	.62919E-13	0.00000	.42443E-13	0.00000	-.74564E-13	0.00000	-.47663E-01	0.00000	-.17062E+00	0.00000
.77737E-01	0.00000	.11534E-12	0.00000	.30727E-13	0.00000	.43900E-13	0.00000	-.47663E-01	0.00000	.17062E+00	0.00000
.20367E+00	0.00000	.40291E-13	0.00000	-.22842E-13	0.00000	-.44128E-13	0.00000	.16208E+00	0.00000	.28791E-01	0.00000
-.20367E+00	0.00000	.25831E-13	0.00000	.12949E-13	0.00000	-.17326E-14	0.00000	.16208E+00	0.00000	-.28791E-01	0.00000
-.18399E+00	0.00000	-.29870E-13	0.00000	-.35652E-13	0.00000	.92918E-14	0.00000	-.16191E+00	0.00000	.58341E-01	0.00000
.18399E+00	0.00000	-.58727E-13	0.00000	-.29154E-13	0.00000	.51758E-14	0.00000	-.16191E+00	0.00000	-.58341E-01	0.00000
-.10309E-01	0.00000	-.60617E-13	0.00000	-.58047E-15	0.00000	.12887E-14	0.00000	-.10325E-01	0.00000	-.10400E+00	0.00000
.10309E-01	0.00000	-.13784E-12	0.00000	.10720E-13	0.00000	.50439E-14	0.00000	-.10325E-01	0.00000	.10400E+00	0.00000
.19724E+00	0.00000	-.21427E-13	0.00000	.37188E-13	0.00000	-.22862E-13	0.00000	.16737E+00	0.00000	.50995E-01	0.00000
-.19724E+00	0.00000	-.97697E-13	0.00000	.40189E-13	0.00000	-.14649E-13	0.00000	.16737E+00	0.00000	-.50995E-01	0.00000
-.19724E+00	0.00000	.32227E-13	0.00000	-.11642E-13	0.00000	-.32619E-13	0.00000	-.16737E+00	0.00000	.50995E-01	0.00000
.19724E+00	0.00000	-.33525E-13	0.00000	-.76745E-14	0.00000	-.25780E-13	0.00000	-.16737E+00	0.00000	-.50995E-01	0.00000
.10309E-01	0.00000	.75285E-13	0.00000	-.18040E-13	0.00000	.82444E-14	0.00000	.10325E-01	0.00000	-.10400E+00	0.00000
-.10309E-01	0.00000	.50161E-13	0.00000	-.20088E-13	0.00000	.87465E-14	0.00000	.10325E-01	0.00000	.10400E+00	0.00000
.18399E+00	0.00000	.48179E-13	0.00000	.50880E-13	0.00000	.15386E-13	0.00000	.16191E+00	0.00000	.58341E-01	0.00000
-.18399E+00	0.00000	.88239E-13	0.00000	.51087E-13	0.00000	.12555E-13	0.00000	.16191E+00	0.00000	-.58341E-01	0.00000
-.20367E+00	0.00000	-.32124E-13	0.00000	.43035E-14	0.00000	-.19265E-14	0.00000	-.16208E+00	0.00000	.28791E-01	0.00000
.20367E+00	0.00000	.50805E-13	0.00000	.18759E-13	0.00000	-.97561E-15	0.00000	-.16208E+00	0.00000	-.28791E-01	0.00000
.77737E-01	0.00000	-.99514E-13	0.00000	-.41535E-13	0.00000	.28801E-13	0.00000	.47663E-01	0.00000	-.17062E+00	0.00000
-.77737E-01	0.00000	.41617E-13	0.00000	-.43940E-13	0.00000	.30705E-13	0.00000	.47663E-01	0.00000	.17062E+00	0.00000

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NATURAL FREQUENCY= .862306E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.21346E-01	0.00000	-.12510E-12	0.00000	.42746E-13	0.00000	.39084E-13	0.00000	.38121E-12	0.00000	.24655E+00	0.00000
-.21346E-01	0.00000	-.13111E-13	0.00000	.37974E-14	0.00000	-.77780E-14	0.00000	.37243E-12	0.00000	.24655E+00	0.00000
-.92837E-01	0.00000	-.77482E-13	0.00000	-.32725E-13	0.00000	.37425E-13	0.00000	-.12839E-11	0.00000	-.11989E+00	0.00000
-.92837E-01	0.00000	.13920E-13	0.00000	-.50104E-13	0.00000	.23168E-14	0.00000	-.12652E-11	0.00000	-.11989E+00	0.00000
.25646E+00	0.00000	.81340E-14	0.00000	.61490E-13	0.00000	.29982E-13	0.00000	.13193E-11	0.00000	.65701E-01	0.00000
.25646E+00	0.00000	.21612E-13	0.00000	.51997E-13	0.00000	.15668E-13	0.00000	.12570E-11	0.00000	.65701E-01	0.00000
-.24404E+00	0.00000	.93463E-13	0.00000	-.16101E-13	0.00000	-.56955E-13	0.00000	.12229E-12	0.00000	.67100E-01	0.00000
-.24404E+00	0.00000	.12811E-13	0.00000	.29685E-14	0.00000	-.48734E-13	0.00000	.76110E-13	0.00000	.67100E-01	0.00000
.10177E+00	0.00000	.10019E-12	0.00000	-.37758E-13	0.00000	-.18948E-13	0.00000	-.13277E-11	0.00000	-.14990E+00	0.00000
.10177E+00	0.00000	-.11437E-13	0.00000	-.53943E-13	0.00000	-.13498E-13	0.00000	-.13156E-11	0.00000	-.14990E+00	0.00000
.10177E+00	0.00000	.79736E-13	0.00000	.61070E-13	0.00000	-.15209E-13	0.00000	.13225E-11	0.00000	.14990E+00	0.00000
.10177E+00	0.00000	-.48754E-13	0.00000	.61186E-13	0.00000	-.28990E-13	0.00000	.13446E-11	0.00000	.14990E+00	0.00000
-.24404E+00	0.00000	.27595E-13	0.00000	-.38071E-14	0.00000	-.25548E-13	0.00000	-.13946E-12	0.00000	-.67100E-01	0.00000
-.24404E+00	0.00000	-.52713E-13	0.00000	-.55266E-14	0.00000	-.28097E-13	0.00000	-.11984E-12	0.00000	-.67100E-01	0.00000
.25646E+00	0.00000	-.34175E-13	0.00000	-.24190E-13	0.00000	.34762E-13	0.00000	-.12250E-11	0.00000	-.65701E-01	0.00000
.25646E+00	0.00000	-.25056E-13	0.00000	-.20124E-13	0.00000	.15320E-13	0.00000	-.12109E-11	0.00000	-.65701E-01	0.00000
-.92837E-01	0.00000	-.55191E-13	0.00000	.36227E-13	0.00000	.17249E-13	0.00000	.12098E-11	0.00000	.11989E+00	0.00000
-.92837E-01	0.00000	.24709E-13	0.00000	.46468E-13	0.00000	.32557E-13	0.00000	.12279E-11	0.00000	.11989E+00	0.00000
-.21346E-01	0.00000	-.72079E-13	0.00000	-.15550E-13	0.00000	.39923E-14	0.00000	-.34972E-12	0.00000	-.24655E+00	0.00000
-.21346E-01	0.00000	.61487E-13	0.00000	-.28107E-13	0.00000	.14541E-13	0.00000	-.34784E-12	0.00000	-.24655E+00	0.00000

NATURAL FREQUENCY= .873360E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.35419E-13	0.00000	-.18443E+00	0.00000	.16319E+00	0.00000	-.10008E-01	0.00000	-.95999E-13	0.00000	.26005E-12	0.00000
-.49980E-13	0.00000	.18443E+00	0.00000	.16319E+00	0.00000	-.10008E-01	0.00000	.10108E-12	0.00000	.29668E-15	0.00000
-.13985E-12	0.00000	-.15136E+00	0.00000	-.22855E+00	0.00000	.50910E-01	0.00000	-.16943E-12	0.00000	-.72727E-13	0.00000
.75475E-13	0.00000	.15136E+00	0.00000	-.22855E+00	0.00000	.50910E-01	0.00000	-.19452E-13	0.00000	-.51409E-13	0.00000
.22353E-12	0.00000	-.52076E-01	0.00000	.76219E-01	0.00000	.80586E-01	0.00000	.65146E-13	0.00000	.23956E-14	0.00000
.27456E-13	0.00000	.52076E-01	0.00000	.76219E-01	0.00000	.80586E-01	0.00000	.14277E-12	0.00000	.73133E-13	0.00000
-.12166E-12	0.00000	.11168E+00	0.00000	.10367E-01	0.00000	-.11764E+00	0.00000	.36427E-13	0.00000	.61709E-13	0.00000
-.13353E-12	0.00000	-.11168E+00	0.00000	.10367E-01	0.00000	-.11764E+00	0.00000	.27843E-13	0.00000	-.31409E-13	0.00000
-.22116E-13	0.00000	.17365E+00	0.00000	-.20079E+00	0.00000	-.37230E-01	0.00000	-.70524E-13	0.00000	-.82098E-13	0.00000
.19487E-12	0.00000	-.17365E+00	0.00000	-.20079E+00	0.00000	-.37230E-01	0.00000	-.11326E-12	0.00000	.62390E-15	0.00000
.13930E-12	0.00000	.17365E+00	0.00000	.20079E+00	0.00000	-.37230E-01	0.00000	.17906E-12	0.00000	.59585E-13	0.00000
-.13803E-12	0.00000	-.17365E+00	0.00000	.20079E+00	0.00000	-.37230E-01	0.00000	.58337E-13	0.00000	.56768E-13	0.00000
-.11759E-12	0.00000	.11168E+00	0.00000	-.10367E-01	0.00000	-.11764E+00	0.00000	.16042E-16	0.00000	.12411E-13	0.00000
.55839E-14	0.00000	-.11168E+00	0.00000	-.10367E-01	0.00000	-.11764E+00	0.00000	-.13569E-12	0.00000	-.11249E-12	0.00000
.16493E-13	0.00000	-.52076E-01	0.00000	-.76219E-01	0.00000	.80586E-01	0.00000	.16831E-13	0.00000	-.62382E-13	0.00000
.13069E-12	0.00000	.52076E-01	0.00000	-.76219E-01	0.00000	.80586E-01	0.00000	-.98529E-13	0.00000	.43938E-13	0.00000
.58261E-13	0.00000	-.15136E+00	0.00000	.22855E+00	0.00000	.50910E-01	0.00000	.11065E-12	0.00000	.41911E-13	0.00000
-.12938E-12	0.00000	.15136E+00	0.00000	.22855E+00	0.00000	.50910E-01	0.00000	.24008E-13	0.00000	.37317E-13	0.00000
-.39083E-13	0.00000	-.18443E+00	0.00000	-.16319E+00	0.00000	-.10008E-01	0.00000	.12549E-14	0.00000	-.45893E-13	0.00000
.14662E-13	0.00000	.18443E+00	0.00000	-.16319E+00	0.00000	-.10008E-01	0.00000	-.56138E-13	0.00000	-.12513E-12	0.00000

NATURAL FREQUENCY= .933079E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.33843E-13	0.00000	-.23041E-11	0.00000	-.11590E-11	0.00000	.49546E-11	0.00000	-.22361E+00	0.00000	-.41851E-13	0.00000
-.64350E-14	0.00000	.19857E-11	0.00000	-.12178E-11	0.00000	.49806E-11	0.00000	.22361E+00	0.00000	-.76943E-13	0.00000
-.23986E-14	0.00000	.18949E-11	0.00000	.44259E-11	0.00000	-.29145E-11	0.00000	-.22361E+00	0.00000	.50877E-13	0.00000
.37338E-13	0.00000	-.19047E-11	0.00000	.43797E-11	0.00000	-.29024E-11	0.00000	.22361E+00	0.00000	-.48596E-14	0.00000
-.29710E-14	0.00000	.35084E-11	0.00000	-.90659E-11	0.00000	-.78777E-12	0.00000	-.22361E+00	0.00000	.48675E-14	0.00000
-.64472E-13	0.00000	-.32803E-11	0.00000	-.90706E-11	0.00000	-.79520E-12	0.00000	.22361E+00	0.00000	-.31148E-13	0.00000
.25899E-13	0.00000	.33591E-11	0.00000	.80250E-11	0.00000	.15895E-12	0.00000	-.22361E+00	0.00000	.22153E-13	0.00000
.92365E-13	0.00000	-.30148E-11	0.00000	.80361E-11	0.00000	.15090E-12	0.00000	.22361E+00	0.00000	-.39492E-13	0.00000
-.31306E-13	0.00000	.20832E-11	0.00000	-.20653E-11	0.00000	-.35958E-11	0.00000	-.22361E+00	0.00000	-.80281E-14	0.00000
-.52327E-13	0.00000	-.18993E-11	0.00000	-.20491E-11	0.00000	-.35857E-11	0.00000	.22361E+00	0.00000	.16179E-14	0.00000
.57270E-13	0.00000	-.23956E-11	0.00000	-.23279E-11	0.00000	.36696E-11	0.00000	-.22361E+00	0.00000	-.31857E-13	0.00000
.67926E-13	0.00000	.21898E-11	0.00000	-.23293E-11	0.00000	.36655E-11	0.00000	.22361E+00	0.00000	-.21664E-13	0.00000
-.37133E-13	0.00000	-.35372E-11	0.00000	.80354E-11	0.00000	.70632E-15	0.00000	-.22361E+00	0.00000	-.45589E-14	0.00000
-.25077E-13	0.00000	.32333E-11	0.00000	.80512E-11	0.00000	.25889E-13	0.00000	.22361E+00	0.00000	.46581E-14	0.00000
.48697E-13	0.00000	-.34129E-11	0.00000	-.90204E-11	0.00000	.67178E-12	0.00000	-.22361E+00	0.00000	-.27950E-13	0.00000
.40260E-14	0.00000	.32287E-11	0.00000	-.90312E-11	0.00000	.67177E-12	0.00000	.22361E+00	0.00000	-.27930E-13	0.00000
-.51567E-14	0.00000	-.16656E-11	0.00000	.40932E-11	0.00000	.28357E-11	0.00000	-.22361E+00	0.00000	.26251E-13	0.00000
.36958E-13	0.00000	.16798E-11	0.00000	.41150E-11	0.00000	.28544E-11	0.00000	.22361E+00	0.00000	-.17284E-13	0.00000
-.29856E-13	0.00000	.25816E-11	0.00000	-.93056E-12	0.00000	-.49850E-11	0.00000	-.22361E+00	0.00000	-.48182E-13	0.00000
-.94800E-15	0.00000	-.23214E-11	0.00000	-.93835E-12	0.00000	-.49849E-11	0.00000	.22361E+00	0.00000	-.26941E-13	0.00000

NATURAL FREQUENCY= .934532E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.32656E-13	0.00000	.72543E-01	0.00000	.33451E-01	0.00000	-.15719E+00	0.00000	-.68167E-11	0.00000	.36537E-13	0.00000
-.55539E-13	0.00000	-.72543E-01	0.00000	.33451E-01	0.00000	-.15719E+00	0.00000	.67657E-11	0.00000	-.14632E-13	0.00000
-.33680E-14	0.00000	-.56170E-01	0.00000	-.13428E+00	0.00000	.91002E-01	0.00000	-.67807E-11	0.00000	.20135E-13	0.00000
.56340E-14	0.00000	.56170E-01	0.00000	-.13428E+00	0.00000	.91002E-01	0.00000	.67521E-11	0.00000	-.30461E-14	0.00000
.26101E-13	0.00000	-.10552E+00	0.00000	.28571E+00	0.00000	.22929E-01	0.00000	-.67785E-11	0.00000	-.37612E-14	0.00000
-.47925E-13	0.00000	.10552E+00	0.00000	.28571E+00	0.00000	.22929E-01	0.00000	.68209E-11	0.00000	-.15208E-13	0.00000
-.23875E-13	0.00000	-.10360E+00	0.00000	-.25451E+00	0.00000	-.19250E-02	0.00000	-.70048E-11	0.00000	-.55883E-14	0.00000
.17751E-13	0.00000	.10360E+00	0.00000	-.25451E+00	0.00000	-.19250E-02	0.00000	.69016E-11	0.00000	-.56986E-14	0.00000
.33449E-13	0.00000	-.67506E-01	0.00000	.69625E-01	0.00000	.11471E+00	0.00000	-.71425E-11	0.00000	-.11425E-13	0.00000
-.27648E-13	0.00000	.67506E-01	0.00000	.69625E-01	0.00000	.11471E+00	0.00000	.71662E-11	0.00000	.14215E-13	0.00000
-.39244E-14	0.00000	.67506E-01	0.00000	.69625E-01	0.00000	-.11471E+00	0.00000	-.73915E-11	0.00000	-.85860E-14	0.00000
-.57318E-13	0.00000	-.67506E-01	0.00000	.69625E-01	0.00000	-.11471E+00	0.00000	.73974E-11	0.00000	-.12739E-13	0.00000
.49443E-14	0.00000	.10360E+00	0.00000	-.25451E+00	0.00000	.19250E-02	0.00000	-.76020E-11	0.00000	-.72724E-14	0.00000
.48450E-13	0.00000	-.10360E+00	0.00000	-.25451E+00	0.00000	.19250E-02	0.00000	.75449E-11	0.00000	.10238E-15	0.00000
.20464E-13	0.00000	.10552E+00	0.00000	.28571E+00	0.00000	-.22929E-01	0.00000	-.77352E-11	0.00000	-.81691E-14	0.00000
-.66278E-13	0.00000	-.10552E+00	0.00000	.28571E+00	0.00000	-.22929E-01	0.00000	.77879E-11	0.00000	.18724E-13	0.00000
-.32617E-13	0.00000	.56170E-01	0.00000	-.13428E+00	0.00000	-.91002E-01	0.00000	-.78657E-11	0.00000	.25535E-13	0.00000
-.29465E-13	0.00000	-.56170E-01	0.00000	-.13428E+00	0.00000	-.91002E-01	0.00000	.78576E-11	0.00000	-.25160E-13	0.00000
.28164E-13	0.00000	-.72543E-01	0.00000	.33451E-01	0.00000	.15719E+00	0.00000	-.78923E-11	0.00000	.39398E-13	0.00000
.14403E-13	0.00000	.72543E-01	0.00000	.33451E-01	0.00000	.15719E+00	0.00000	.79154E-11	0.00000	.83384E-13	0.00000

NATURAL FREQUENCY= .948258E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.93832E-14	0.00000	-.22723E-12	0.00000	-.10822E-12	0.00000	.54885E-12	0.00000	.31233E+00	0.00000	.21342E-13	0.00000
.31455E-15	0.00000	.29997E-12	0.00000	-.95530E-13	0.00000	.50914E-12	0.00000	-.31233E+00	0.00000	.83357E-13	0.00000
.16172E-13	0.00000	.17550E-12	0.00000	.42875E-12	0.00000	-.26517E-12	0.00000	.28176E+00	0.00000	.44627E-14	0.00000
-.60995E-13	0.00000	-.14440E-12	0.00000	.43265E-12	0.00000	-.33238E-12	0.00000	-.28176E+00	0.00000	-.31047E-13	0.00000
-.33829E-14	0.00000	.29987E-12	0.00000	-.95638E-12	0.00000	-.50792E-13	0.00000	.22361E+00	0.00000	.34070E-14	0.00000
.70798E-13	0.00000	-.36893E-12	0.00000	-.97169E-12	0.00000	-.73883E-13	0.00000	-.22361E+00	0.00000	-.40427E-15	0.00000
.20755E-13	0.00000	.30654E-12	0.00000	.86555E-12	0.00000	-.70394E-14	0.00000	.14356E+00	0.00000	.10370E-13	0.00000
-.82704E-13	0.00000	-.42849E-12	0.00000	.86265E-12	0.00000	-.64522E-14	0.00000	-.14356E+00	0.00000	.10582E-13	0.00000
-.14671E-13	0.00000	.22004E-12	0.00000	-.24975E-12	0.00000	-.38227E-12	0.00000	.49469E-01	0.00000	.93979E-14	0.00000
.43945E-13	0.00000	-.30409E-12	0.00000	-.22344E-12	0.00000	-.42544E-12	0.00000	-.49469E-01	0.00000	-.10059E-13	0.00000
.57647E-14	0.00000	-.18789E-12	0.00000	-.24717E-12	0.00000	.39303E-12	0.00000	-.49469E-01	0.00000	.37224E-14	0.00000
-.57024E-13	0.00000	.21257E-12	0.00000	-.24785E-12	0.00000	.37455E-12	0.00000	.49469E-01	0.00000	.15989E-13	0.00000
.14907E-13	0.00000	-.29237E-12	0.00000	.87319E-12	0.00000	.20514E-14	0.00000	-.14356E+00	0.00000	.22959E-13	0.00000
.92386E-14	0.00000	.40783E-12	0.00000	.88700E-12	0.00000	-.35086E-14	0.00000	.14356E+00	0.00000	-.15792E-13	0.00000
-.33095E-13	0.00000	-.30500E-12	0.00000	-.96344E-12	0.00000	.96234E-13	0.00000	-.22361E+00	0.00000	-.46828E-14	0.00000
.13479E-13	0.00000	.42624E-12	0.00000	-.95729E-12	0.00000	.81636E-13	0.00000	.22361E+00	0.00000	.41511E-14	0.00000
.15481E-13	0.00000	-.20988E-12	0.00000	.47807E-12	0.00000	.32402E-12	0.00000	-.28176E+00	0.00000	-.12823E-13	0.00000
-.40264E-13	0.00000	.21442E-12	0.00000	.47614E-12	0.00000	.33444E-12	0.00000	.28176E+00	0.00000	.14170E-13	0.00000
.30468E-13	0.00000	.15862E-12	0.00000	-.14005E-12	0.00000	-.51091E-12	0.00000	-.31233E+00	0.00000	.81694E-13	0.00000
.89735E-14	0.00000	-.26007E-12	0.00000	-.14019E-12	0.00000	-.52207E-12	0.00000	.31233E+00	0.00000	-.27957E-13	0.00000

NATURAL FREQUENCY= .964969E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.44950E-01	0.00000	-.37685E-13	0.00000	.41226E-13	0.00000	.11466E-13	0.00000	.16696E-01	0.00000	.16035E+00	0.00000
-.44950E-01	0.00000	-.64469E-13	0.00000	.16949E-13	0.00000	-.54686E-13	0.00000	.16696E-01	0.00000	-.16035E+00	0.00000
-.14844E+00	0.00000	.85997E-14	0.00000	.68832E-14	0.00000	-.84117E-14	0.00000	-.12018E+00	0.00000	-.55926E-01	0.00000
.14844E+00	0.00000	-.31957E-13	0.00000	-.23050E-13	0.00000	-.27892E-13	0.00000	-.12018E+00	0.00000	.55926E-01	0.00000
.22611E+00	0.00000	-.29900E-14	0.00000	.38307E-13	0.00000	.42798E-14	0.00000	.21015E+00	0.00000	.16322E-01	0.00000
-.22611E+00	0.00000	.20878E-13	0.00000	.46877E-13	0.00000	-.13260E-15	0.00000	.21015E+00	0.00000	-.16322E-01	0.00000
-.20095E+00	0.00000	.78628E-14	0.00000	-.81672E-14	0.00000	-.25576E-13	0.00000	-.17748E+00	0.00000	.45817E-01	0.00000
.20095E+00	0.00000	.48026E-13	0.00000	-.68905E-14	0.00000	-.24043E-13	0.00000	-.17748E+00	0.00000	-.45817E-01	0.00000
.78343E-01	0.00000	.16596E-13	0.00000	-.56204E-13	0.00000	.92314E-14	0.00000	.70821E-01	0.00000	-.86603E-01	0.00000
-.78343E-01	0.00000	.39652E-13	0.00000	-.58331E-13	0.00000	.10598E-13	0.00000	.70821E-01	0.00000	.86603E-01	0.00000
.78343E-01	0.00000	.11492E-13	0.00000	.20046E-13	0.00000	.12355E-13	0.00000	.70821E-01	0.00000	.86603E-01	0.00000
-.78343E-01	0.00000	-.30808E-13	0.00000	.21350E-13	0.00000	.96368E-14	0.00000	.70821E-01	0.00000	-.86603E-01	0.00000
-.20095E+00	0.00000	.18139E-13	0.00000	.48279E-14	0.00000	-.34148E-13	0.00000	-.17748E+00	0.00000	-.45817E-01	0.00000
.20095E+00	0.00000	-.75530E-13	0.00000	.77249E-14	0.00000	-.13871E-13	0.00000	-.17748E+00	0.00000	.45817E-01	0.00000
.22611E+00	0.00000	.26679E-13	0.00000	-.14624E-15	0.00000	-.25382E-13	0.00000	.21015E+00	0.00000	-.16322E-01	0.00000
-.22611E+00	0.00000	-.70932E-13	0.00000	-.19651E-13	0.00000	-.36345E-13	0.00000	.21015E+00	0.00000	.16322E-01	0.00000
-.14844E+00	0.00000	.35909E-13	0.00000	-.36795E-13	0.00000	-.83402E-14	0.00000	-.12018E+00	0.00000	.55926E-01	0.00000
.14844E+00	0.00000	-.33146E-13	0.00000	-.39506E-13	0.00000	-.12321E-13	0.00000	-.12018E+00	0.00000	-.55926E-01	0.00000
.44950E-01	0.00000	.56382E-13	0.00000	.41916E-13	0.00000	.20765E-13	0.00000	.16696E-01	0.00000	-.16035E+00	0.00000
-.44950E-01	0.00000	.25418E-13	0.00000	.37948E-13	0.00000	.18378E-13	0.00000	.16696E-01	0.00000	.16035E+00	0.00000

NATURAL FREQUENCY= .98934E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.53495E-01	0.00000	-.63788E-13	0.00000	.30964E-13	0.00000	-.21353E-13	0.00000	-.26372E-11	0.00000	-.23210E+00	0.00000
.53495E-01	0.00000	.56289E-13	0.00000	.23142E-13	0.00000	.30468E-13	0.00000	.24801E-11	0.00000	-.23210E+00	0.00000
-.63265E-02	0.00000	-.15717E-13	0.00000	-.56168E-13	0.00000	-.47705E-14	0.00000	-.10757E-11	0.00000	.10972E+00	0.00000
-.63265E-02	0.00000	.31214E-13	0.00000	-.59982E-13	0.00000	.37372E-13	0.00000	.19496E-11	0.00000	.10972E+00	0.00000
-.14137E+00	0.00000	.28315E-13	0.00000	.35932E-13	0.00000	-.46286E-14	0.00000	-.62277E-12	0.00000	-.13533E+00	0.00000
-.14137E+00	0.00000	-.27297E-13	0.00000	.38733E-13	0.00000	-.48407E-15	0.00000	-.89430E-12	0.00000	-.13533E+00	0.00000
.23175E+00	0.00000	.31107E-13	0.00000	-.35741E-13	0.00000	-.28961E-13	0.00000	.23251E-11	0.00000	.83041E-01	0.00000
.23175E+00	0.00000	-.69960E-13	0.00000	-.46713E-13	0.00000	-.26470E-13	0.00000	-.11139E-11	0.00000	.83041E-01	0.00000
-.28788E+00	0.00000	.85534E-14	0.00000	.22528E-13	0.00000	.25703E-14	0.00000	.25358E-11	0.00000	-.31879E-01	0.00000
-.28788E+00	0.00000	-.47004E-13	0.00000	.21444E-13	0.00000	.78231E-14	0.00000	-.27964E-11	0.00000	-.31879E-01	0.00000
.28788E+00	0.00000	.16929E-13	0.00000	.47802E-13	0.00000	-.45977E-14	0.00000	.22372E-11	0.00000	-.31879E-01	0.00000
.28788E+00	0.00000	-.11424E-14	0.00000	.28131E-13	0.00000	-.13571E-13	0.00000	-.29797E-11	0.00000	-.31879E-01	0.00000
-.23175E+00	0.00000	-.12255E-14	0.00000	-.64063E-13	0.00000	.30782E-13	0.00000	.23066E-11	0.00000	.83041E-01	0.00000
-.23175E+00	0.00000	.58745E-13	0.00000	-.51439E-13	0.00000	.99319E-14	0.00000	-.87639E-12	0.00000	.83041E-01	0.00000
.14137E+00	0.00000	-.36120E-13	0.00000	.23743E-13	0.00000	.28464E-13	0.00000	-.83054E-12	0.00000	-.13533E+00	0.00000
.14137E+00	0.00000	.51678E-13	0.00000	.31822E-13	0.00000	.32181E-13	0.00000	-.77489E-12	0.00000	-.13533E+00	0.00000
.63265E-02	0.00000	-.13279E-13	0.00000	.25010E-13	0.00000	-.70146E-14	0.00000	-.12221E-11	0.00000	.10972E+00	0.00000
.63265E-02	0.00000	.21950E-13	0.00000	.14305E-13	0.00000	.26698E-14	0.00000	.20308E-11	0.00000	.10972E+00	0.00000
-.53495E-01	0.00000	-.28104E-13	0.00000	-.23195E-13	0.00000	-.19137E-13	0.00000	-.26488E-11	0.00000	-.23210E+00	0.00000
-.53495E-01	0.00000	-.36672E-13	0.00000	-.25529E-13	0.00000	-.19119E-13	0.00000	.25853E-11	0.00000	-.23210E+00	0.00000

NATURAL FREQUENCY= .990994E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.37130E-12	0.00000	.20721E-13	0.00000	-.51634E-14	0.00000	.13146E-14	0.00000	.30075E+00	0.00000	-.15725E-11	0.00000
.37613E-12	0.00000	-.20263E-13	0.00000	.17545E-13	0.00000	-.45727E-13	0.00000	-.30075E+00	0.00000	-.15626E-11	0.00000
-.10649E-12	0.00000	-.26347E-13	0.00000	.39127E-14	0.00000	.10734E-13	0.00000	.18587E+00	0.00000	.72721E-12	0.00000
-.80308E-13	0.00000	.31264E-13	0.00000	-.12262E-13	0.00000	-.15191E-13	0.00000	-.18587E+00	0.00000	.74529E-12	0.00000
-.89034E-12	0.00000	-.55855E-13	0.00000	.37214E-13	0.00000	.36195E-13	0.00000	.33747E-12	0.00000	-.89636E-12	0.00000
-.93421E-12	0.00000	.37581E-13	0.00000	.26013E-13	0.00000	.11339E-13	0.00000	-.24701E-12	0.00000	-.92429E-12	0.00000
.14926E-11	0.00000	-.35365E-14	0.00000	.73287E-14	0.00000	-.98515E-14	0.00000	-.18587E+00	0.00000	.57163E-12	0.00000
.15561E-11	0.00000	.29284E-13	0.00000	.58645E-14	0.00000	-.14339E-13	0.00000	.18587E+00	0.00000	.57288E-12	0.00000
-.18900E-11	0.00000	.27665E-13	0.00000	-.58687E-13	0.00000	-.20168E-14	0.00000	-.30075E+00	0.00000	-.24208E-12	0.00000
-.19151E-11	0.00000	.31437E-14	0.00000	-.55641E-13	0.00000	-.21812E-13	0.00000	.30075E+00	0.00000	-.20752E-12	0.00000
.19148E-11	0.00000	.44000E-13	0.00000	-.12022E-13	0.00000	.42853E-15	0.00000	-.30075E+00	0.00000	-.19808E-12	0.00000
.18794E-11	0.00000	-.52493E-13	0.00000	.41203E-14	0.00000	-.91192E-14	0.00000	.30075E+00	0.00000	-.20167E-12	0.00000
-.15514E-11	0.00000	.44346E-13	0.00000	.27182E-13	0.00000	-.20050E-13	0.00000	-.18587E+00	0.00000	.57717E-12	0.00000
-.15102E-11	0.00000	-.61126E-13	0.00000	.28263E-13	0.00000	-.77287E-13	0.00000	.18587E+00	0.00000	.56456E-12	0.00000
.94481E-12	0.00000	-.32159E-14	0.00000	-.67270E-13	0.00000	.43161E-13	0.00000	-.24458E-12	0.00000	-.88832E-12	0.00000
.92605E-12	0.00000	.12256E-13	0.00000	-.68437E-13	0.00000	.10978E-13	0.00000	.26906E-12	0.00000	-.88017E-12	0.00000
.47928E-13	0.00000	-.54131E-13	0.00000	.11242E-12	0.00000	.36595E-13	0.00000	.18587E+00	0.00000	.71347E-12	0.00000
.56482E-13	0.00000	.49177E-13	0.00000	.13794E-12	0.00000	.31414E-13	0.00000	-.18587E+00	0.00000	.74925E-12	0.00000
-.34314E-12	0.00000	-.71548E-13	0.00000	-.51353E-13	0.00000	-.57912E-14	0.00000	.30075E+00	0.00000	-.15344E-11	0.00000
-.35133E-12	0.00000	.80781E-13	0.00000	-.52450E-13	0.00000	-.12319E-13	0.00000	-.30075E+00	0.00000	-.15772E-11	0.00000

NATURAL FREQUENCY= .102477E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.13645E-13	0.00000	-.22336E+00	0.00000	.11262E+00	0.00000	.85954E-01	0.00000	-.13071E-12	0.00000	.31515E-13	0.00000
.28788E-13	0.00000	.22336E+00	0.00000	.11262E+00	0.00000	.85954E-01	0.00000	.18309E-12	0.00000	.13092E-13	0.00000
-.22537E-13	0.00000	-.44763E-01	0.00000	-.19882E+00	0.00000	.13673E-01	0.00000	-.74552E-13	0.00000	-.23812E-13	0.00000
-.54040E-14	0.00000	.44763E-01	0.00000	-.19882E+00	0.00000	.13673E-01	0.00000	.11796E-12	0.00000	-.91916E-14	0.00000
.29691E-14	0.00000	.16728E+00	0.00000	.71852E-01	0.00000	-.57623E-01	0.00000	.20506E-13	0.00000	-.11511E-13	0.00000
.21803E-13	0.00000	-.16728E+00	0.00000	.71852E-01	0.00000	-.57623E-01	0.00000	.26056E-13	0.00000	.49762E-14	0.00000
-.62244E-14	0.00000	.25003E+00	0.00000	-.69712E-01	0.00000	-.13630E+00	0.00000	.10708E-12	0.00000	-.40182E-13	0.00000
-.36100E-13	0.00000	-.25003E+00	0.00000	-.69712E-01	0.00000	-.13630E+00	0.00000	-.62467E-13	0.00000	.27954E-13	0.00000
.31063E-13	0.00000	.10636E+00	0.00000	.84056E-01	0.00000	-.16740E-01	0.00000	.84173E-13	0.00000	.34837E-13	0.00000
.40311E-13	0.00000	-.10636E+00	0.00000	.84056E-01	0.00000	-.16740E-01	0.00000	-.79474E-13	0.00000	.29015E-13	0.00000
-.19436E-13	0.00000	-.10636E+00	0.00000	.84056E-01	0.00000	.16740E-01	0.00000	.17036E-13	0.00000	-.28877E-13	0.00000
-.28352E-13	0.00000	.10636E+00	0.00000	.84056E-01	0.00000	.16740E-01	0.00000	-.43836E-13	0.00000	.61344E-14	0.00000
.36729E-13	0.00000	-.25003E+00	0.00000	-.69712E-01	0.00000	.13630E+00	0.00000	-.46970E-13	0.00000	.13819E-13	0.00000
.21333E-13	0.00000	.25003E+00	0.00000	-.69712E-01	0.00000	.13630E+00	0.00000	-.19157E-13	0.00000	.20856E-13	0.00000
-.52705E-14	0.00000	-.16728E+00	0.00000	.71852E-01	0.00000	.57623E-01	0.00000	-.55363E-13	0.00000	-.10351E-13	0.00000
-.31282E-13	0.00000	.16728E+00	0.00000	.71852E-01	0.00000	.57623E-01	0.00000	-.21301E-13	0.00000	.27192E-13	0.00000
.43979E-13	0.00000	.44763E-01	0.00000	-.19882E+00	0.00000	-.13673E-01	0.00000	-.47306E-13	0.00000	.27750E-13	0.00000
-.30648E-13	0.00000	-.44763E-01	0.00000	-.19882E+00	0.00000	-.13673E-01	0.00000	-.75473E-14	0.00000	-.18433E-13	0.00000
.12255E-13	0.00000	.22336E+00	0.00000	.11262E+00	0.00000	-.85954E-01	0.00000	-.47406E-13	0.00000	-.33466E-13	0.00000
-.59443E-14	0.00000	-.22336E+00	0.00000	.11262E+00	0.00000	-.85954E-01	0.00000	-.38436E-13	0.00000	.44472E-13	0.00000

NATURAL FREQUENCY= .103705E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.53361E-13	0.00000	.64569E-02	0.00000	-.36690E-01	0.00000	.85662E-01	0.00000	-.43491E-12	0.00000	.14814E-12	0.00000
-.28379E-13	0.00000	-.64569E-02	0.00000	-.36690E-01	0.00000	.85662E-01	0.00000	.52834E-12	0.00000	.11769E-12	0.00000
.34190E-13	0.00000	.59364E-01	0.00000	.10683E+00	0.00000	-.79287E-01	0.00000	-.12014E-12	0.00000	-.34839E-13	0.00000
.86338E-13	0.00000	-.59364E-01	0.00000	.10683E+00	0.00000	-.79287E-01	0.00000	.59362E-13	0.00000	.30239E-13	0.00000
.28490E-13	0.00000	.25774E-01	0.00000	-.19854E+00	0.00000	.36118E-01	0.00000	.39957E-12	0.00000	.71820E-13	0.00000
-.66660E-13	0.00000	-.25774E-01	0.00000	-.19854E+00	0.00000	.36118E-01	0.00000	-.32121E-12	0.00000	.37609E-13	0.00000
-.52208E-13	0.00000	.12511E-02	0.00000	.28667E+00	0.00000	-.30843E-01	0.00000	.50838E-12	0.00000	-.15042E-13	0.00000
.79017E-13	0.00000	-.12511E-02	0.00000	.28667E+00	0.00000	-.30843E-01	0.00000	-.61468E-12	0.00000	-.10904E-13	0.00000
.44638E-13	0.00000	-.44375E-01	0.00000	-.30535E+00	0.00000	.30472E-01	0.00000	.38093E-12	0.00000	.45044E-13	0.00000
-.67143E-13	0.00000	.44375E-01	0.00000	-.30535E+00	0.00000	.30472E-01	0.00000	-.24455E-12	0.00000	.16701E-13	0.00000
-.66229E-13	0.00000	-.44375E-01	0.00000	.30535E+00	0.00000	.30472E-01	0.00000	-.28705E-12	0.00000	-.20004E-13	0.00000
.69895E-13	0.00000	.44375E-01	0.00000	.30535E+00	0.00000	.30472E-01	0.00000	.19407E-12	0.00000	-.12201E-13	0.00000
.26567E-13	0.00000	.12511E-02	0.00000	-.28667E+00	0.00000	-.30843E-01	0.00000	-.56388E-12	0.00000	.24760E-13	0.00000
-.52328E-13	0.00000	-.12511E-02	0.00000	-.28667E+00	0.00000	-.30843E-01	0.00000	.66921E-12	0.00000	.13412E-13	0.00000
-.48116E-13	0.00000	.25774E-01	0.00000	.19854E+00	0.00000	.36118E-01	0.00000	-.43308E-12	0.00000	.22720E-13	0.00000
.38213E-13	0.00000	-.25774E-01	0.00000	.19854E+00	0.00000	.36118E-01	0.00000	.45516E-12	0.00000	-.69904E-14	0.00000
.53781E-14	0.00000	.59364E-01	0.00000	-.10683E+00	0.00000	-.79287E-01	0.00000	.86400E-13	0.00000	-.24215E-13	0.00000
.92291E-14	0.00000	-.59364E-01	0.00000	-.10683E+00	0.00000	-.79287E-01	0.00000	-.60538E-13	0.00000	.15961E-13	0.00000
-.14810E-13	0.00000	.64569E-02	0.00000	.36690E-01	0.00000	.85662E-01	0.00000	.55516E-12	0.00000	.24635E-13	0.00000
-.17624E-13	0.00000	-.64569E-02	0.00000	.36690E-01	0.00000	.85662E-01	0.00000	-.57187E-12	0.00000	-.27519E-13	0.00000

NATURAL FREQUENCY= .104408E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.19669E-01	0.00000	-.65984E-13	0.00000	.31907E-13	0.00000	.18435E-13	0.00000	.43670E-02	0.00000	-.11099E+00	0.00000
.19689E-01	0.00000	.34540E-13	0.00000	.57240E-13	0.00000	-.14367E-13	0.00000	.43670E-02	0.00000	.11099E+00	0.00000
.73349E-01	0.00000	-.41054E-13	0.00000	-.39493E-13	0.00000	.75658E-13	0.00000	.59221E-01	0.00000	.44438E-01	0.00000
-.73349E-01	0.00000	.23519E-13	0.00000	-.64972E-13	0.00000	-.20770E-13	0.00000	.59221E-01	0.00000	-.44438E-01	0.00000
-.14742E+00	0.00000	.37616E-13	0.00000	.21240E-13	0.00000	-.24593E-13	0.00000	-.14900E+00	0.00000	-.46836E-01	0.00000
.14742E+00	0.00000	-.56953E-16	0.00000	.26758E-13	0.00000	-.11660E-14	0.00000	-.14900E+00	0.00000	.46836E-01	0.00000
.20718E+00	0.00000	.52852E-13	0.00000	-.41871E-13	0.00000	-.16707E-13	0.00000	.19485E+00	0.00000	.30795E-01	0.00000
-.20718E+00	0.00000	-.57793E-13	0.00000	-.52399E-13	0.00000	-.20399E-13	0.00000	.19485E+00	0.00000	-.30795E-01	0.00000
-.23548E+00	0.00000	.36115E-13	0.00000	.65024E-13	0.00000	-.66927E-14	0.00000	-.22585E+00	0.00000	-.98881E-02	0.00000
.23548E+00	0.00000	-.59516E-13	0.00000	.62779E-13	0.00000	-.14708E-13	0.00000	-.22585E+00	0.00000	.98881E-02	0.00000
.23548E+00	0.00000	-.14736E-13	0.00000	-.58390E-13	0.00000	-.10530E-13	0.00000	.22585E+00	0.00000	-.98831E-02	0.00000
-.23548E+00	0.00000	-.17708E-13	0.00000	-.58402E-13	0.00000	-.14149E-13	0.00000	.22585E+00	0.00000	.98881E-02	0.00000
-.20718E+00	0.00000	-.19573E-13	0.00000	.25497E-13	0.00000	.54061E-13	0.00000	-.19485E+00	0.00000	.30795E-01	0.00000
.20718E+00	0.00000	.58931E-13	0.00000	.13883E-13	0.00000	.34583E-13	0.00000	-.19485E+00	0.00000	-.30795E-01	0.00000
.14742E+00	0.00000	-.12838E-13	0.00000	-.55226E-14	0.00000	.15254E-13	0.00000	.14900E+00	0.00000	-.46836E-01	0.00000
-.14742E+00	0.00000	.56153E-13	0.00000	.70766E-14	0.00000	.30180E-14	0.00000	.14900E+00	0.00000	.46836E-01	0.00000
-.73349E-01	0.00000	-.39100E-14	0.00000	-.12914E-13	0.00000	.65496E-14	0.00000	-.59221E-01	0.00000	.44438E-01	0.00000
.73349E-01	0.00000	-.17520E-14	0.00000	-.11876E-13	0.00000	.10784E-13	0.00000	-.59221E-01	0.00000	-.44438E-01	0.00000
.19669E-01	0.00000	.73792E-14	0.00000	.20125E-13	0.00000	-.27782E-13	0.00000	-.43670E-02	0.00000	-.11099E+00	0.00000
-.19689E-01	0.00000	-.62265E-13	0.00000	.20223E-13	0.00000	-.28297E-13	0.00000	-.43670E-02	0.00000	.11099E+00	0.00000

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.14796E-13	0.00000	-.97427E-13	0.00000	-.13386E-12	0.00000	.22275E-12	0.00000	.28176E+00	0.00000	-.24557E-13	0.00000
.91327E-14	0.00000	-.18095E-12	0.00000	-.12722E-12	0.00000	.26495E-12	0.00000	-.28176E+00	0.00000	-.12333E-14	0.00000
-.38979E-14	0.00000	.22083E-12	0.00000	.32576E-12	0.00000	-.24242E-12	0.00000	.49469E-01	0.00000	.44179E-13	0.00000
-.56429E-13	0.00000	-.11631E-12	0.00000	.32606E-12	0.00000	-.24116E-12	0.00000	-.49469E-01	0.00000	.43737E-13	0.00000
-.68121E-14	0.00000	.20555E-12	0.00000	-.55950E-12	0.00000	.12796E-12	0.00000	-.22361E+00	0.00000	.16449E-13	0.00000
.53894E-13	0.00000	.93936E-13	0.00000	-.54575E-12	0.00000	.10460E-12	0.00000	.22361E+00	0.00000	.27971E-13	0.00000
.24177E-13	0.00000	.78460E-14	0.00000	.84269E-12	0.00000	-.57143E-13	0.00000	-.31233E+00	0.00000	.17057E-13	0.00000
.12767E-13	0.00000	.69972E-13	0.00000	.83946E-12	0.00000	-.89428E-13	0.00000	.31233E+00	0.00000	-.53827E-14	0.00000
-.74024E-13	0.00000	-.27298E-12	0.00000	-.90165E-12	0.00000	.72109E-13	0.00000	-.14356E+00	0.00000	-.17642E-13	0.00000
.38066E-13	0.00000	.16197E-14	0.00000	-.91617E-12	0.00000	.11602E-12	0.00000	.14356E+00	0.00000	.45233E-13	0.00000
.61593E-13	0.00000	-.23181E-12	0.00000	.87207E-12	0.00000	.78210E-13	0.00000	.14356E+00	0.00000	-.21876E-13	0.00000
-.20121E-13	0.00000	-.30583E-13	0.00000	.89841E-12	0.00000	.65311E-13	0.00000	-.14356E+00	0.00000	.30837E-14	0.00000
-.72795E-13	0.00000	.84823E-13	0.00000	-.83806E-12	0.00000	-.97740E-13	0.00000	.31233E+00	0.00000	.49656E-13	0.00000
.59251E-13	0.00000	.17410E-13	0.00000	-.84364E-12	0.00000	-.10771E-12	0.00000	-.31233E+00	0.00000	.54827E-13	0.00000
.15800E-13	0.00000	.26847E-12	0.00000	.58027E-12	0.00000	.10592E-12	0.00000	.22361E+00	0.00000	-.30559E-13	0.00000
-.30220E-13	0.00000	.76224E-13	0.00000	.57053E-12	0.00000	.93953E-13	0.00000	-.22361E+00	0.00000	-.12296E-13	0.00000
.25275E-14	0.00000	.23147E-12	0.00000	-.27853E-12	0.00000	-.23399E-12	0.00000	-.49469E-01	0.00000	.43930E-13	0.00000
.99399E-13	0.00000	-.14079E-12	0.00000	-.28110E-12	0.00000	-.23829E-12	0.00000	.49469E-01	0.00000	.13715E-13	0.00000
-.74008E-13	0.00000	-.16736E-12	0.00000	.95021E-13	0.00000	.27365E-12	0.00000	-.28176E+00	0.00000	-.97903E-13	0.00000
.45191E-15	0.00000	-.14620E-12	0.00000	.91693E-13	0.00000	.26913E-12	0.00000	.28176E+00	0.00000	-.13753E-12	0.00000

NATURAL FREQUENCY= .10969OE+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.18482E-13	0.00000	-.25583E+00	0.00000	.86949E-14	0.00000	-.31009E-13	0.00000	-.43844E-13	0.00000	.29151E-13	0.00000
-.23369E-13	0.00000	-.25583E+00	0.00000	.20584E-13	0.00000	.13597E-13	0.00000	.70707E-13	0.00000	.40291E-13	0.00000
.24297E-14	0.00000	.97720E-01	0.00000	.44083E-14	0.00000	-.20926E-13	0.00000	-.96118E-13	0.00000	.32884E-13	0.00000
.38234E-13	0.00000	.97720E-01	0.00000	-.43507E-13	0.00000	.14062E-13	0.00000	.94085E-13	0.00000	.11830E-13	0.00000
-.34014E-13	0.00000	.31623E+00	0.00000	.35958E-13	0.00000	-.37207E-13	0.00000	.29836E-13	0.00000	-.14362E-13	0.00000
.30914E-13	0.00000	.31623E+00	0.00000	.16958E-13	0.00000	.37220E-13	0.00000	.75228E-13	0.00000	-.25504E-13	0.00000
-.38332E-13	0.00000	.97720E-01	0.00000	-.35261E-13	0.00000	-.28221E-13	0.00000	.22500E-12	0.00000	.81879E-14	0.00000
.42506E-14	0.00000	.97720E-01	0.00000	-.42061E-14	0.00000	-.48979E-13	0.00000	-.15467E-12	0.00000	.34253E-13	0.00000
-.23027E-13	0.00000	-.25583E+00	0.00000	.43067E-13	0.00000	.26901E-13	0.00000	.31283E-12	0.00000	.89255E-14	0.00000
.30374E-13	0.00000	-.25583E+00	0.00000	.10603E-14	0.00000	.16467E-13	0.00000	-.27817E-12	0.00000	.11822E-13	0.00000
.83807E-14	0.00000	-.25583E+00	0.00000	.78999E-14	0.00000	-.43998E-14	0.00000	.84224E-13	0.00000	-.22849E-13	0.00000
.56143E-14	0.00000	-.25583E+00	0.00000	.28057E-13	0.00000	.15776E-14	0.00000	-.34383E-13	0.00000	-.95683E-14	0.00000
.80368E-15	0.00000	.97720E-01	0.00000	-.10095E-13	0.00000	.39385E-13	0.00000	-.32051E-12	0.00000	.21652E-13	0.00000
-.25072E-14	0.00000	.97720E-01	0.00000	-.74692E-14	0.00000	.13561E-13	0.00000	.30084E-12	0.00000	.39295E-13	0.00000
.28191E-13	0.00000	.31623E+00	0.00000	.76115E-14	0.00000	.98079E-14	0.00000	-.41094E-12	0.00000	-.10323E-13	0.00000
.26880E-14	0.00000	.31623E+00	0.00000	.24079E-13	0.00000	.21073E-13	0.00000	.35822E-12	0.00000	-.22093E-13	0.00000
-.12060E-14	0.00000	.97720E-01	0.00000	-.53584E-13	0.00000	.15722E-13	0.00000	.54688E-13	0.00000	.31840E-14	0.00000
.10030E-15	0.00000	.97720E-01	0.00000	-.46603E-13	0.00000	-.23331E-13	0.00000	.46404E-13	0.00000	-.29787E-13	0.00000
-.19772E-13	0.00000	-.25583E+00	0.00000	.11622E-13	0.00000	-.27587E-13	0.00000	.47145E-12	0.00000	-.67369E-13	0.00000
.75098E-14	0.00000	-.25583E+00	0.00000	.11372E-13	0.00000	-.34532E-14	0.00000	-.42162E-12	0.00000	.46921E-13	0.00000

NATURAL FREQUENCY= .112863E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.33689E-13	0.00000	.22239E-12	0.00000	.18277E-13	0.00000	.29623E-13	0.00000	.25583E+00	0.00000	.93808E-14	0.00000
.10627E-13	0.00000	.28195E-12	0.00000	.14958E-13	0.00000	.21546E-13	0.00000	-.25583E+00	0.00000	-.10156E-12	0.00000
-.11407E-13	0.00000	-.10353E-12	0.00000	-.55313E-13	0.00000	-.19611E-13	0.00000	-.97720E-01	0.00000	-.16244E-13	0.00000
-.81958E-13	0.00000	-.79188E-13	0.00000	-.32908E-13	0.00000	-.14389E-13	0.00000	.97720E-01	0.00000	.99543E-14	0.00000
.26764E-13	0.00000	-.30651E-12	0.00000	.69085E-13	0.00000	.46783E-13	0.00000	-.31623E+00	0.00000	.21242E-13	0.00000
.66121E-14	0.00000	-.31535E-12	0.00000	.40113E-13	0.00000	-.19203E-14	0.00000	.31623E+00	0.00000	.19473E-14	0.00000
.32151E-14	0.00000	-.57721E-13	0.00000	-.36247E-13	0.00000	-.57886E-13	0.00000	-.97720E-01	0.00000	.12875E-13	0.00000
-.51601E-14	0.00000	-.12952E-12	0.00000	-.49750E-13	0.00000	-.40350E-13	0.00000	.97720E-01	0.00000	-.17440E-13	0.00000
-.20326E-13	0.00000	.21735E-12	0.00000	.20438E-13	0.00000	.37255E-13	0.00000	.25583E+00	0.00000	.48505E-13	0.00000
-.10743E-13	0.00000	.26250E-12	0.00000	.78463E-13	0.00000	.64555E-13	0.00000	-.25583E+00	0.00000	.42865E-13	0.00000
.16593E-14	0.00000	.23547E-12	0.00000	-.18747E-13	0.00000	-.19431E-13	0.00000	.25583E+00	0.00000	-.96331E-14	0.00000
.43095E-13	0.00000	.25892E-12	0.00000	.76021E-15	0.00000	-.35120E-13	0.00000	-.25583E+00	0.00000	-.20552E-13	0.00000
-.77833E-13	0.00000	-.96405E-13	0.00000	.10089E-13	0.00000	.70767E-14	0.00000	-.97720E-01	0.00000	.11404E-13	0.00000
.90401E-14	0.00000	-.73312E-13	0.00000	.40836E-13	0.00000	.36911E-13	0.00000	.97720E-01	0.00000	-.31589E-14	0.00000
-.25630E-13	0.00000	-.27305E-12	0.00000	-.37528E-13	0.00000	-.18514E-13	0.00000	-.31623E+00	0.00000	.27276E-13	0.00000
.46198E-13	0.00000	-.34171E-12	0.00000	-.13274E-13	0.00000	-.41880E-13	0.00000	.31623E+00	0.00000	.25479E-13	0.00000
-.72128E-13	0.00000	-.68738E-13	0.00000	.43918E-13	0.00000	.41722E-14	0.00000	-.97720E-01	0.00000	.49462E-13	0.00000
.85906E-14	0.00000	-.12434E-12	0.00000	.16833E-13	0.00000	-.17372E-13	0.00000	.97720E-01	0.00000	.19488E-13	0.00000
-.45916E-13	0.00000	.21670E-12	0.00000	-.19212E-13	0.00000	.40909E-13	0.00000	.25583E+00	0.00000	.46859E-13	0.00000
.81426E-13	0.00000	.26336E-12	0.00000	-.22460E-13	0.00000	-.70604E-14	0.00000	-.25583E+00	0.00000	.65768E-13	0.00000

NATURAL FREQUENCY= .113131E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.15597E+00	0.00000	-.73070E-13	0.00000	.34782E-13	0.00000	-.55302E-13	0.00000	.26599E-12	0.00000	-.37940E+00	0.00000
.15597E+00	0.00000	.50310E-13	0.00000	.14072E-13	0.00000	.14789E-12	0.00000	-.32156E-12	0.00000	-.37940E+00	0.00000
-.20667E+00	0.00000	.17533E-13	0.00000	-.72030E-13	0.00000	-.26576E-13	0.00000	-.13791E-12	0.00000	.48199E-01	0.00000
-.20667E+00	0.00000	.15281E-13	0.00000	.36355E-13	0.00000	-.37890E-13	0.00000	.14512E-12	0.00000	.48199E-01	0.00000
.10085E+00	0.00000	.87977E-13	0.00000	-.10434E-12	0.00000	-.13581E-13	0.00000	-.59189E-12	0.00000	-.13021E+00	0.00000
.10085E+00	0.00000	-.84708E-14	0.00000	-.51864E-13	0.00000	-.13573E-13	0.00000	.30457E-12	0.00000	-.13021E+00	0.00000
-.68627E-01	0.00000	.44152E-13	0.00000	.63997E-13	0.00000	-.20452E-13	0.00000	-.50770E-13	0.00000	.76572E-01	0.00000
-.68627E-01	0.00000	-.33358E-13	0.00000	.47220E-13	0.00000	.13330E-14	0.00000	.33670E-12	0.00000	.76572E-01	0.00000
.18471E-01	0.00000	-.23106E-13	0.00000	-.29976E-13	0.00000	-.12266E-13	0.00000	.24097E-12	0.00000	-.81504E-01	0.00000
.18471E-01	0.00000	-.27365E-13	0.00000	-.41564E-13	0.00000	-.54575E-14	0.00000	-.35331E-12	0.00000	-.81504E-01	0.00000
.18471E-01	0.00000	-.33856E-13	0.00000	.64887E-13	0.00000	.29476E-14	0.00000	.48506E-12	0.00000	.81504E-01	0.00000
.18471E-01	0.00000	.25665E-14	0.00000	.54859E-13	0.00000	.22645E-13	0.00000	-.22114E-12	0.00000	.81504E-01	0.00000
-.68627E-01	0.00000	-.31574E-13	0.00000	-.38184E-13	0.00000	.10169E-13	0.00000	-.12835E-12	0.00000	-.76572E-01	0.00000
-.68627E-01	0.00000	.39198E-13	0.00000	-.31708E-13	0.00000	-.63352E-14	0.00000	.20433E-13	0.00000	-.76572E-01	0.00000
.10085E+00	0.00000	.12087E-13	0.00000	.12451E-13	0.00000	.29896E-13	0.00000	-.32802E-12	0.00000	.13021E+00	0.00000
.10085E+00	0.00000	.74538E-13	0.00000	.11672E-13	0.00000	.31103E-13	0.00000	.40887E-12	0.00000	.13021E+00	0.00000
-.20667E+00	0.00000	-.38259E-16	0.00000	.12404E-14	0.00000	-.67968E-14	0.00000	.17657E-12	0.00000	-.48199E-01	0.00000
-.20667E+00	0.00000	.49085E-14	0.00000	.35619E-15	0.00000	-.38430E-14	0.00000	.53381E-13	0.00000	-.48199E-01	0.00000
.15597E+00	0.00000	-.29103E-13	0.00000	-.85959E-14	0.00000	-.63128E-14	0.00000	.28158E-12	0.00000	.37940E+00	0.00000
.15597E+00	0.00000	-.22962E-13	0.00000	-.11023E-13	0.00000	-.53146E-14	0.00000	-.33649E-12	0.00000	.37940E+00	0.00000

NATURAL FREQUENCY= .114542E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.15747E+00	0.00000	-.28129E-13	0.00000	-.13316E-13	0.00000	.39570E-13	0.00000	.43041E-12	0.00000	.36426E+00	0.00000
.15747E+00	0.00000	.41627E-13	0.00000	.60946E-13	0.00000	-.90759E-13	0.00000	.34017E-12	0.00000	.36426E+00	0.00000
.21803E+00	0.00000	.25044E-13	0.00000	-.11472E-13	0.00000	-.77859E-14	0.00000	.80067E-13	0.00000	-.21696E-01	0.00000
.21803E+00	0.00000	.69723E-13	0.00000	-.20986E-13	0.00000	-.10884E-13	0.00000	.12341E-13	0.00000	-.21696E-01	0.00000
-.13226E+00	0.00000	.13624E-13	0.00000	-.31266E-13	0.00000	-.94957E-14	0.00000	.19407E-13	0.00000	.95833E-01	0.00000
-.13226E+00	0.00000	.15434E-13	0.00000	-.25943E-13	0.00000	-.11781E-14	0.00000	.11531E-12	0.00000	.95833E-01	0.00000
.12396E+00	0.00000	.28929E-13	0.00000	-.38682E-13	0.00000	.43371E-14	0.00000	.15065E-13	0.00000	-.25080E-01	0.00000
.12396E+00	0.00000	-.37929E-13	0.00000	-.39480E-13	0.00000	.17180E-14	0.00000	.19986E-12	0.00000	-.25080E-01	0.00000
-.10676E+00	0.00000	.43935E-13	0.00000	.67741E-13	0.00000	-.20180E-13	0.00000	-.43375E-13	0.00000	.17523E-01	0.00000
-.10676E+00	0.00000	-.44163E-13	0.00000	.65537E-13	0.00000	-.74732E-14	0.00000	.12183E-12	0.00000	.17523E-01	0.00000
.10676E+00	0.00000	.31152E-13	0.00000	-.37319E-13	0.00000	-.42973E-13	0.00000	.12278E-12	0.00000	.17523E-01	0.00000
.10676E+00	0.00000	-.40752E-13	0.00000	-.36258E-13	0.00000	-.25426E-13	0.00000	.17470E-12	0.00000	.17523E-01	0.00000
-.12396E+00	0.00000	-.13419E-13	0.00000	.73988E-13	0.00000	.46364E-13	0.00000	.23866E-13	0.00000	-.25080E-01	0.00000
-.12396E+00	0.00000	.38148E-13	0.00000	.67183E-13	0.00000	.11062E-13	0.00000	-.42246E-13	0.00000	-.25080E-01	0.00000
.13226E+00	0.00000	-.39365E-13	0.00000	-.45912E-13	0.00000	.20148E-13	0.00000	.57653E-13	0.00000	.95833E-01	0.00000
.13226E+00	0.00000	.49929E-13	0.00000	-.31138E-13	0.00000	.76360E-14	0.00000	-.45739E-13	0.00000	.95833E-01	0.00000
-.21803E+00	0.00000	-.49035E-13	0.00000	.10903E-13	0.00000	.37461E-13	0.00000	-.18542E-13	0.00000	-.21696E-01	0.00000
-.21803E+00	0.00000	.43065E-13	0.00000	.24183E-13	0.00000	.31175E-13	0.00000	-.67484E-13	0.00000	-.21696E-01	0.00000
.15747E+00	0.00000	-.30066E-13	0.00000	-.17033E-13	0.00000	-.29961E-13	0.00000	-.40303E-13	0.00000	.36426E+00	0.00000
.15747E+00	0.00000	-.22218E-13	0.00000	-.17452E-13	0.00000	-.21185E-13	0.00000	-.19871E-13	0.00000	.36426E+00	0.00000

NATURAL FREQUENCY= .118472E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.94264E-14	0.00000	.17818E+00	0.00000	-.64245E-01	0.00000	-.19199E+00	0.00000	-.41357E-13	0.00000	.16511E-12	0.00000
.53271E-14	0.00000	-.17818E+00	0.00000	-.64245E-01	0.00000	-.19199E+00	0.00000	-.13792E-12	0.00000	-.21467E-12	0.00000
.17127E-13	0.00000	-.11819E+00	0.00000	.14612E+00	0.00000	.88940E-01	0.00000	.71632E-13	0.00000	-.29757E-13	0.00000
-.11759E-14	0.00000	.11819E+00	0.00000	.14612E+00	0.00000	.88940E-01	0.00000	.16859E-12	0.00000	-.65311E-13	0.00000
-.27170E-13	0.00000	-.24336E+00	0.00000	-.53985E-01	0.00000	.11036E+00	0.00000	-.53545E-13	0.00000	.25892E-13	0.00000
.15255E-13	0.00000	.24336E+00	0.00000	-.53985E-01	0.00000	.11036E+00	0.00000	.38794E-13	0.00000	.35157E-13	0.00000
.26177E-13	0.00000	-.64114E-01	0.00000	-.36605E-01	0.00000	.43062E-01	0.00000	-.65236E-13	0.00000	.47358E-13	0.00000
.16318E-13	0.00000	.64114E-01	0.00000	-.36605E-01	0.00000	.43062E-01	0.00000	-.37325E-13	0.00000	.27698E-13	0.00000
-.54130E-14	0.00000	.20458E+00	0.00000	-.63127E-01	0.00000	-.11212E+00	0.00000	-.27642E-13	0.00000	.36859E-13	0.00000
-.28062E-13	0.00000	-.20458E+00	0.00000	-.63127E-01	0.00000	-.11212E+00	0.00000	.15958E-13	0.00000	.69357E-14	0.00000
-.13645E-13	0.00000	.20458E+00	0.00000	.63127E-01	0.00000	-.11212E+00	0.00000	.86174E-13	0.00000	.67930E-13	0.00000
-.24345E-14	0.00000	-.20458E+00	0.00000	.63127E-01	0.00000	-.11212E+00	0.00000	-.61148E-13	0.00000	.92241E-13	0.00000
.49091E-13	0.00000	-.64114E-01	0.00000	.36605E-01	0.00000	.43062E-01	0.00000	.62997E-13	0.00000	-.14438E-13	0.00000
-.20345E-13	0.00000	.64114E-01	0.00000	.36605E-01	0.00000	.43062E-01	0.00000	-.12024E-12	0.00000	.73225E-13	0.00000
.47611E-13	0.00000	-.24336E+00	0.00000	.53985E-01	0.00000	.11036E+00	0.00000	-.18036E-12	0.00000	-.71804E-13	0.00000
-.38851E-13	0.00000	.24336E+00	0.00000	.53985E-01	0.00000	.11036E+00	0.00000	.20776E-13	0.00000	-.32760E-13	0.00000
.88654E-13	0.00000	-.11819E+00	0.00000	-.14612E+00	0.00000	.88940E-01	0.00000	-.25615E-12	0.00000	-.56006E-13	0.00000
-.50299E-13	0.00000	.11819E+00	0.00000	-.14612E+00	0.00000	.88940E-01	0.00000	-.91416E-14	0.00000	.21244E-13	0.00000
.68725E-13	0.00000	.17818E+00	0.00000	.64245E-01	0.00000	-.19199E+00	0.00000	.51138E-14	0.00000	-.14348E-13	0.00000
-.11630E-12	0.00000	-.17818E+00	0.00000	.64245E-01	0.00000	-.19199E+00	0.00000	-.22986E-12	0.00000	-.10273E-12	0.00000

NATURAL FREQUENCY= .119231E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.18062E-13	0.00000	.45277E-12	0.00000	.19870E+00	0.00000	-.42654E+00	0.00000	.41576E-13	0.00000	.26328E-12	0.00000
.73829E-13	0.00000	-.42794E-12	0.00000	-.19870E+00	0.00000	.42654E+00	0.00000	-.42260E-12	0.00000	-.16843E-12	0.00000
.86094E-13	0.00000	-.29010E-12	0.00000	-.11262E+00	0.00000	-.10554E+00	0.00000	-.92907E-13	0.00000	.61599E-13	0.00000
.14735E-13	0.00000	.29513E-12	0.00000	.11262E+00	0.00000	.10554E+00	0.00000	.20881E-12	0.00000	-.50179E-13	0.00000
.65299E-13	0.00000	-.61487E-12	0.00000	-.87166E-01	0.00000	.35349E-01	0.00000	-.13829E-12	0.00000	-.27515E-13	0.00000
.22811E-13	0.00000	.60525E-12	0.00000	.87166E-01	0.00000	-.35349E-01	0.00000	.22443E-12	0.00000	-.10453E-12	0.00000
.23550E-13	0.00000	-.17906E-12	0.00000	-.15146E-01	0.00000	.37874E-01	0.00000	.19364E-12	0.00000	-.71171E-14	0.00000
.27086E-13	0.00000	.15636E-12	0.00000	.15146E-01	0.00000	-.37874E-01	0.00000	.12050E-14	0.00000	-.42357E-13	0.00000
.10437E-12	0.00000	.50575E-12	0.00000	.16229E-01	0.00000	.11531E-01	0.00000	.28899E-12	0.00000	-.81468E-14	0.00000
.79146E-13	0.00000	-.48892E-12	0.00000	-.16229E-01	0.00000	-.11531E-01	0.00000	-.15792E-12	0.00000	-.44016E-14	0.00000
.57966E-14	0.00000	.54653E-12	0.00000	.16229E-01	0.00000	-.11531E-01	0.00000	-.93850E-13	0.00000	-.65487E-13	0.00000
.28031E-13	0.00000	-.55200E-12	0.00000	-.16229E-01	0.00000	.11531E-01	0.00000	.22089E-12	0.00000	.40992E-13	0.00000
.13167E-13	0.00000	-.13894E-12	0.00000	-.15146E-01	0.00000	-.37874E-01	0.00000	-.22949E-12	0.00000	-.33409E-13	0.00000
.40749E-13	0.00000	.12625E-12	0.00000	.15146E-01	0.00000	.37874E-01	0.00000	.15700E-12	0.00000	.52897E-13	0.00000
.49899E-13	0.00000	-.61969E-12	0.00000	-.87166E-01	0.00000	-.35349E-01	0.00000	.12009E-13	0.00000	-.13946E-13	0.00000
.50035E-13	0.00000	.65028E-12	0.00000	.87166E-01	0.00000	.35349E-01	0.00000	-.25906E-12	0.00000	.69218E-13	0.00000
.19507E-12	0.00000	-.33018E-12	0.00000	-.11262E+00	0.00000	.10554E+00	0.00000	.11903E-12	0.00000	-.39281E-13	0.00000
-.19286E-12	0.00000	.32336E-12	0.00000	.11262E+00	0.00000	-.10554E+00	0.00000	-.39478E-12	0.00000	.14979E-12	0.00000
.18528E-12	0.00000	.45297E-12	0.00000	.19870E+00	0.00000	.42654E+00	0.00000	-.69730E-12	0.00000	-.21640E-12	0.00000
-.17217E-12	0.00000	-.45410E-12	0.00000	-.19870E+00	0.00000	-.42654E+00	0.00000	-.26124E-12	0.00000	.19087E-12	0.00000

NATURAL FREQUENCY= .119250E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.22404E-13	0.00000	.15413E-12	0.00000	.19992E+00	0.00000	-.42810E+00	0.00000	-.17240E-12	0.00000	.15083E-12	0.00000
-.29675E-13	0.00000	-.13058E-12	0.00000	-.19992E+00	0.00000	.42810E+00	0.00000	.80951E-13	0.00000	-.28578E-13	0.00000
.46241E-13	0.00000	-.94708E-13	0.00000	-.11209E+00	0.00000	-.10570E+00	0.00000	.23664E-12	0.00000	.21548E-13	0.00000
.16319E-13	0.00000	.91008E-13	0.00000	.11209E+00	0.00000	.10570E+00	0.00000	-.20975E-12	0.00000	-.10075E-13	0.00000
-.67181E-14	0.00000	-.19637E-12	0.00000	-.86243E-01	0.00000	.34097E-01	0.00000	.12043E-12	0.00000	.69274E-13	0.00000
-.21253E-13	0.00000	.19071E-12	0.00000	.86243E-01	0.00000	-.34097E-01	0.00000	-.15715E-12	0.00000	.37911E-13	0.00000
.17459E-13	0.00000	-.43290E-13	0.00000	-.18034E-01	0.00000	.32349E-01	0.00000	-.20454E-12	0.00000	.29394E-13	0.00000
.27950E-13	0.00000	.53261E-13	0.00000	.18034E-01	0.00000	-.32349E-01	0.00000	.27802E-12	0.00000	-.18461E-13	0.00000
-.55425E-13	0.00000	.14767E-12	0.00000	.20325E-02	0.00000	.59623E-02	0.00000	-.97203E-13	0.00000	.10799E-13	0.00000
.49123E-13	0.00000	-.15168E-12	0.00000	-.20325E-02	0.00000	-.59623E-02	0.00000	.15177E-12	0.00000	.14096E-13	0.00000
.33072E-13	0.00000	.15823E-12	0.00000	-.20325E-02	0.00000	.59623E-02	0.00000	.22537E-12	0.00000	-.62476E-13	0.00000
-.19670E-13	0.00000	-.16513E-12	0.00000	.20325E-02	0.00000	-.59623E-02	0.00000	-.27492E-12	0.00000	.81453E-13	0.00000
.10767E-12	0.00000	-.44711E-13	0.00000	.18034E-01	0.00000	.32349E-01	0.00000	-.27834E-13	0.00000	.18147E-13	0.00000
.10416E-12	0.00000	.27495E-13	0.00000	-.18034E-01	0.00000	-.32349E-01	0.00000	-.18100E-12	0.00000	.13669E-12	0.00000
.13325E-12	0.00000	-.19213E-12	0.00000	.86243E-01	0.00000	.34097E-01	0.00000	-.44649E-12	0.00000	-.81231E-13	0.00000
-.95133E-13	0.00000	.19481E-12	0.00000	-.86243E-01	0.00000	-.34097E-01	0.00000	-.89635E-13	0.00000	.15417E-12	0.00000
.42428E-12	0.00000	-.11856E-12	0.00000	.11209E+00	0.00000	-.10570E+00	0.00000	-.41218E-12	0.00000	-.14553E-12	0.00000
-.37949E-12	0.00000	.10669E-12	0.00000	-.11209E+00	0.00000	.10570E+00	0.00000	-.13197E-12	0.00000	.17119E-12	0.00000
.37996E-12	0.00000	.13813E-12	0.00000	-.19992E+00	0.00000	-.42810E+00	0.00000	-.79997E-12	0.00000	-.49363E-12	0.00000
-.38519E-12	0.00000	-.14275E-12	0.00000	.19992E+00	0.00000	.42810E+00	0.00000	-.11064E-11	0.00000	.44340E-12	0.00000

NATURAL FREQUENCY= .119940E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.12403E+00	0.00000	-.74955E-13	0.00000	-.50058E-13	0.00000	.23218E-12	0.00000	-.18605E+00	0.00000	.22490E-10	0.00000
-.12403E+00	0.00000	.90577E-13	0.00000	.13098E-12	0.00000	-.36625E-13	0.00000	-.18605E+00	0.00000	-.21993E-10	0.00000
.12403E+00	0.00000	.40067E-13	0.00000	.44859E-13	0.00000	.38120E-13	0.00000	-.18605E+00	0.00000	.69975E-11	0.00000
-.12403E+00	0.00000	.55090E-13	0.00000	-.64449E-13	0.00000	-.76197E-13	0.00000	-.18605E+00	0.00000	-.70400E-11	0.00000
.12403E+00	0.00000	.70937E-13	0.00000	-.34521E-13	0.00000	-.64393E-13	0.00000	-.18605E+00	0.00000	.75983E-11	0.00000
-.12403E+00	0.00000	-.55557E-13	0.00000	-.13971E-12	0.00000	-.19197E-13	0.00000	-.18605E+00	0.00000	-.74005E-11	0.00000
.12403E+00	0.00000	-.61307E-14	0.00000	.72598E-13	0.00000	-.41134E-13	0.00000	-.18605E+00	0.00000	.38175E-11	0.00000
-.12403E+00	0.00000	-.69969E-13	0.00000	-.13933E-13	0.00000	.48798E-13	0.00000	-.18605E+00	0.00000	-.37696E-11	0.00000
.12403E+00	0.00000	-.83975E-13	0.00000	.27196E-13	0.00000	.24780E-14	0.00000	-.18605E+00	0.00000	.38364E-11	0.00000
-.12403E+00	0.00000	-.89047E-14	0.00000	.62816E-13	0.00000	.53285E-13	0.00000	-.18605E+00	0.00000	-.36653E-11	0.00000
.12403E+00	0.00000	-.42289E-13	0.00000	-.67562E-13	0.00000	.45094E-13	0.00000	-.18605E+00	0.00000	.35383E-11	0.00000
-.12403E+00	0.00000	.21749E-13	0.00000	-.32621E-13	0.00000	.31687E-14	0.00000	-.18605E+00	0.00000	-.34038E-11	0.00000
.12403E+00	0.00000	.46243E-13	0.00000	.10845E-13	0.00000	-.68649E-14	0.00000	-.18605E+00	0.00000	.31672E-11	0.00000
-.12403E+00	0.00000	.16327E-13	0.00000	.20721E-13	0.00000	.13938E-13	0.00000	-.18605E+00	0.00000	-.32275E-11	0.00000
.12403E+00	0.00000	.96879E-13	0.00000	-.15284E-13	0.00000	-.28026E-14	0.00000	-.18605E+00	0.00000	.61457E-11	0.00000
-.12403E+00	0.00000	-.11035E-13	0.00000	-.60485E-14	0.00000	-.22267E-13	0.00000	-.18605E+00	0.00000	-.61069E-11	0.00000
.12403E+00	0.00000	.40979E-13	0.00000	.14530E-13	0.00000	-.16064E-13	0.00000	-.18605E+00	0.00000	.57877E-11	0.00000
-.12403E+00	0.00000	-.27130E-13	0.00000	.56542E-13	0.00000	-.40559E-13	0.00000	-.18605E+00	0.00000	-.56701E-11	0.00000
.12403E+00	0.00000	-.10349E-12	0.00000	.41792E-14	0.00000	.10312E-12	0.00000	-.18605E+00	0.00000	.18756E-10	0.00000
-.12403E+00	0.00000	.29723E-13	0.00000	-.47307E-13	0.00000	-.55930E-14	0.00000	-.18605E+00	0.00000	-.18342E-10	0.00000

NATURAL FREQUENCY= .120039E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.16477E+00	0.00000	-.77739E-13	0.00000	.23514E-12	0.00000	-.20152E-12	0.00000	-.35484E+00	0.00000	.16581E+00	0.00000
-.16477E+00	0.00000	.62879E-13	0.00000	-.18096E-12	0.00000	.27516E-12	0.00000	-.35484E+00	0.00000	-.16581E+00	0.00000
.16160E+00	0.00000	.36317E-13	0.00000	-.10022E-12	0.00000	-.13119E-12	0.00000	-.13954E+00	0.00000	.51349E-01	0.00000
-.16160E+00	0.00000	.29740E-14	0.00000	-.72891E-13	0.00000	.11946E-12	0.00000	-.13954E+00	0.00000	-.51349E-01	0.00000
.62426E-01	0.00000	.67759E-13	0.00000	-.36482E-13	0.00000	-.20298E-13	0.00000	-.12598E+00	0.00000	.54742E-01	0.00000
-.62426E-01	0.00000	-.91262E-13	0.00000	.11768E-12	0.00000	-.36749E-13	0.00000	-.12598E+00	0.00000	-.54742E-01	0.00000
.51136E-01	0.00000	.66973E-13	0.00000	.41674E-14	0.00000	-.25163E-14	0.00000	-.47597E-01	0.00000	.27630E-01	0.00000
-.51136E-01	0.00000	-.52909E-13	0.00000	.39299E-13	0.00000	-.71852E-13	0.00000	-.47597E-01	0.00000	-.27630E-01	0.00000
.70495E-02	0.00000	-.19367E-13	0.00000	-.64342E-14	0.00000	.41423E-13	0.00000	-.26231E-01	0.00000	.28898E-01	0.00000
-.70495E-02	0.00000	.36951E-13	0.00000	.13564E-13	0.00000	-.33291E-15	0.00000	-.26231E-01	0.00000	-.28898E-01	0.00000
-.70495E-02	0.00000	-.73358E-13	0.00000	.26221E-13	0.00000	.40251E-13	0.00000	.26231E-01	0.00000	.28898E-01	0.00000
.70495E-02	0.00000	.44174E-13	0.00000	-.23115E-13	0.00000	.39716E-13	0.00000	.26231E-01	0.00000	-.28898E-01	0.00000
-.51136E-01	0.00000	-.44265E-13	0.00000	-.41615E-13	0.00000	-.22472E-14	0.00000	.47597E-01	0.00000	.27630E-01	0.00000
.51136E-01	0.00000	-.55791E-14	0.00000	-.25866E-13	0.00000	.26012E-13	0.00000	.47597E-01	0.00000	-.27630E-01	0.00000
-.62426E-01	0.00000	.63416E-13	0.00000	.23992E-14	0.00000	-.87416E-14	0.00000	.12598E+00	0.00000	.54742E-01	0.00000
.62426E-01	0.00000	-.34705E-13	0.00000	-.25870E-13	0.00000	-.18355E-13	0.00000	.12598E+00	0.00000	-.54742E-01	0.00000
-.16160E+00	0.00000	.81457E-13	0.00000	.28960E-13	0.00000	-.48585E-13	0.00000	.13954E+00	0.00000	.51349E-01	0.00000
.16160E+00	0.00000	-.23024E-13	0.00000	-.79489E-14	0.00000	.34862E-14	0.00000	.13954E+00	0.00000	-.51349E-01	0.00000
-.16477E+00	0.00000	-.86077E-14	0.00000	-.13432E-13	0.00000	-.21528E-13	0.00000	.35484E+00	0.00000	.16581E+00	0.00000
.16477E+00	0.00000	-.27660E-14	0.00000	.47058E-13	0.00000	.69655E-13	0.00000	.35484E+00	0.00000	-.16581E+00	0.00000

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.10041E+00	0.00000	-.15037E-13	0.00000	-.66613E-13	0.00000	.34745E-12	0.00000	-.32064E+00	0.00000	.25571E+00	0.00000
-.10041E+00	0.00000	.28510E-13	0.00000	.11415E-12	0.00000	-.26303E-12	0.00000	-.32064E+00	0.00000	-.26571E+00	0.00000
.96932E-01	0.00000	.60229E-13	0.00000	.13844E-12	0.00000	.17502E-13	0.00000	.20283E-01	0.00000	.76028E-01	0.00000
-.96932E-01	0.00000	.23895E-13	0.00000	-.12522E-12	0.00000	-.71316E-13	0.00000	.20283E-01	0.00000	-.76028E-01	0.00000
-.50512E-01	0.00000	.30266E-13	0.00000	.47121E-13	0.00000	-.83163E-13	0.00000	.34062E-01	0.00000	.76602E-01	0.00000
.50512E-01	0.00000	-.37834E-13	0.00000	-.10507E-12	0.00000	.42762E-13	0.00000	.34062E-01	0.00000	-.76602E-01	0.00000
-.57299E-01	0.00000	-.20659E-13	0.00000	.31286E-13	0.00000	-.25742E-13	0.00000	.12951E+00	0.00000	.19675E-01	0.00000
.57299E-01	0.00000	-.35692E-13	0.00000	.30156E-13	0.00000	.15812E-13	0.00000	.12951E+00	0.00000	-.19675E-01	0.00000
.89535E-01	0.00000	-.37803E-13	0.00000	.19956E-13	0.00000	.70476E-14	0.00000	.13678E+00	0.00000	.15941E-01	0.00000
.89535E-01	0.00000	.26335E-13	0.00000	-.23056E-13	0.00000	.52792E-14	0.00000	.13678E+00	0.00000	-.15941E-01	0.00000
.89535E-01	0.00000	-.22561E-13	0.00000	.80990E-14	0.00000	.20741E-13	0.00000	.13678E+00	0.00000	-.15941E-01	0.00000
.89535E-01	0.00000	.58713E-13	0.00000	.80077E-14	0.00000	.33564E-13	0.00000	.13678E+00	0.00000	.15941E-01	0.00000
.57299E-01	0.00000	.54761E-14	0.00000	-.18604E-13	0.00000	.11098E-13	0.00000	.12951E+00	0.00000	-.19675E-01	0.00000
.57299E-01	0.00000	.40708E-15	0.00000	-.24913E-13	0.00000	-.11162E-13	0.00000	.12951E+00	0.00000	.19675E-01	0.00000
.50512E-01	0.00000	.44972E-13	0.00000	-.14614E-13	0.00000	-.25178E-13	0.00000	.34062E-01	0.00000	-.76602E-01	0.00000
.50512E-01	0.00000	-.48872E-13	0.00000	.16703E-13	0.00000	.71944E-15	0.00000	.34062E-01	0.00000	.76602E-01	0.00000
.96932E-01	0.00000	.44153E-13	0.00000	-.65311E-14	0.00000	-.15666E-13	0.00000	.20283E-01	0.00000	-.76028E-01	0.00000
.96932E-01	0.00000	-.23082E-13	0.00000	.17095E-13	0.00000	-.35328E-13	0.00000	.20283E-01	0.00000	.76028E-01	0.00000
.10041E+00	0.00000	-.21279E-13	0.00000	.16312E-13	0.00000	.60942E-13	0.00000	-.32064E+00	0.00000	-.26571E+00	0.00000
.10041E+00	0.00000	.41476E-14	0.00000	-.19531E-13	0.00000	-.33494E-14	0.00000	-.32064E+00	0.00000	.26571E+00	0.00000

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NATURAL FREQUENCY= .120587E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.19639E-13	0.00000	.18124E-13	0.00000	-.19534E-12	0.00000	.43957E-12	0.00000	.22361E+00	0.00000	-.13046E-12	0.00000
.90635E-14	0.00000	-.50978E-13	0.00000	.14645E-12	0.00000	-.44024E-12	0.00000	-.22361E+00	0.00000	.12918E-12	0.00000
.68378E-14	0.00000	-.92499E-14	0.00000	.17934E-12	0.00000	.97762E-13	0.00000	-.22361E+00	0.00000	-.16882E-13	0.00000
-.21955E-13	0.00000	-.74669E-16	0.00000	-.16187E-12	0.00000	-.12007E-12	0.00000	.22361E+00	0.00000	.12111E-12	0.00000
.13288E-12	0.00000	-.47229E-13	0.00000	.16504E-12	0.00000	.16212E-15	0.00000	-.22361E+00	0.00000	-.54341E-13	0.00000
-.82810E-13	0.00000	.72760E-13	0.00000	-.12300E-12	0.00000	.79882E-13	0.00000	.22361E+00	0.00000	.42660E-13	0.00000
.82974E-13	0.00000	-.40603E-13	0.00000	.65496E-14	0.00000	-.77342E-13	0.00000	.22361E+00	0.00000	-.26712E-13	0.00000
-.86675E-13	0.00000	.27110E-13	0.00000	-.60970E-13	0.00000	.10141E-12	0.00000	-.22361E+00	0.00000	-.10776E-12	0.00000
.56537E-13	0.00000	.17416E-13	0.00000	-.81237E-13	0.00000	-.72993E-13	0.00000	.22361E+00	0.00000	.60294E-13	0.00000
-.79904E-13	0.00000	-.61492E-13	0.00000	.59960E-13	0.00000	.62522E-13	0.00000	-.22361E+00	0.00000	.96857E-14	0.00000
.62079E-13	0.00000	.81965E-13	0.00000	-.10652E-12	0.00000	-.39736E-13	0.00000	-.22361E+00	0.00000	-.51880E-13	0.00000
-.12803E-13	0.00000	-.79285E-13	0.00000	.14765E-12	0.00000	-.62823E-13	0.00000	.22361E+00	0.00000	-.96393E-14	0.00000
.44400E-13	0.00000	-.91628E-15	0.00000	-.31850E-13	0.00000	.13177E-12	0.00000	-.22361E+00	0.00000	-.57131E-13	0.00000
-.61446E-13	0.00000	.23758E-13	0.00000	.43427E-13	0.00000	-.99654E-13	0.00000	.22361E+00	0.00000	-.61783E-13	0.00000
.10984E-13	0.00000	-.66481E-13	0.00000	.17994E-12	0.00000	.15614E-12	0.00000	.22361E+00	0.00000	.43944E-13	0.00000
-.38406E-13	0.00000	.57299E-13	0.00000	-.15092E-12	0.00000	-.98981E-13	0.00000	-.22361E+00	0.00000	.75918E-13	0.00000
.15154E-12	0.00000	-.12221E-13	0.00000	.26080E-12	0.00000	-.15203E-12	0.00000	.22361E+00	0.00000	-.48863E-13	0.00000
-.99808E-13	0.00000	.29529E-15	0.00000	-.30890E-12	0.00000	.16410E-12	0.00000	-.22361E+00	0.00000	.50135E-13	0.00000
.83980E-13	0.00000	.42836E-13	0.00000	-.30040E-12	0.00000	-.83781E-12	0.00000	-.22361E+00	0.00000	-.27050E-12	0.00000
-.12199E-12	0.00000	-.43913E-13	0.00000	.29604E-12	0.00000	.82101E-12	0.00000	.22361E+00	0.00000	.23297E-12	0.00000

NATURAL FREQUENCY= .120904E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.27905E-01	0.00000	-.11303E-12	0.00000	.10633E-12	0.00000	-.66418E-13	0.00000	-.13135E+00	0.00000	.28273E+00	0.00000
.27905E-01	0.00000	.14583E-12	0.00000	.56416E-14	0.00000	.28375E-12	0.00000	-.13135E+00	0.00000	-.28273E+00	0.00000
-.19928E-01	0.00000	.88377E-13	0.00000	-.15473E-12	0.00000	-.18513E-13	0.00000	.22074E+00	0.00000	.57962E-01	0.00000
.19928E-01	0.00000	-.38829E-13	0.00000	-.15619E-13	0.00000	-.47608E-13	0.00000	.22074E+00	0.00000	-.57962E-01	0.00000
-.14008E+00	0.00000	.16746E-12	0.00000	.22958E-13	0.00000	-.32434E-13	0.00000	.17884E+00	0.00000	.30774E-01	0.00000
.14008E+00	0.00000	-.18695E-12	0.00000	.50912E-13	0.00000	-.10746E-12	0.00000	.17884E+00	0.00000	-.30774E-01	0.00000
-.80839E-01	0.00000	.91780E-13	0.00000	.32598E-13	0.00000	.47261E-14	0.00000	.18439E+00	0.00000	-.47574E-01	0.00000
.80839E-01	0.00000	-.10223E-12	0.00000	-.11054E-13	0.00000	-.85715E-13	0.00000	.18439E+00	0.00000	.47574E-01	0.00000
-.46064E-01	0.00000	-.10692E-12	0.00000	.59451E-13	0.00000	.48174E-13	0.00000	.50746E-01	0.00000	-.64511E-01	0.00000
.46064E-01	0.00000	.10282E-12	0.00000	-.44204E-14	0.00000	.66975E-13	0.00000	.50746E-01	0.00000	.64511E-01	0.00000
.46064E-01	0.00000	-.14986E-12	0.00000	-.15718E-13	0.00000	.92331E-13	0.00000	-.50746E-01	0.00000	-.64511E-01	0.00000
-.46064E-01	0.00000	.19691E-12	0.00000	-.50730E-13	0.00000	.10719E-12	0.00000	-.50746E-01	0.00000	.64511E-01	0.00000
.80839E-01	0.00000	.79565E-14	0.00000	-.42041E-13	0.00000	-.50787E-13	0.00000	-.18439E+00	0.00000	-.47574E-01	0.00000
-.80839E-01	0.00000	-.49730E-13	0.00000	-.33568E-13	0.00000	-.59330E-14	0.00000	-.18439E+00	0.00000	.47574E-01	0.00000
.14008E+00	0.00000	.16684E-12	0.00000	-.48412E-13	0.00000	-.61683E-13	0.00000	-.17884E+00	0.00000	.30774E-01	0.00000
-.14008E+00	0.00000	-.17387E-12	0.00000	-.34578E-13	0.00000	-.59699E-13	0.00000	-.17884E+00	0.00000	-.30774E-01	0.00000
.19928E-01	0.00000	.10786E-12	0.00000	.98265E-13	0.00000	-.79087E-13	0.00000	-.22074E+00	0.00000	.57962E-01	0.00000
-.19928E-01	0.00000	-.86131E-13	0.00000	.82738E-13	0.00000	-.38986E-13	0.00000	-.22074E+00	0.00000	-.57962E-01	0.00000
.27905E-01	0.00000	-.10030E-12	0.00000	-.39571E-13	0.00000	.14036E-12	0.00000	.13135E+00	0.00000	.28273E+00	0.00000
-.27905E-01	0.00000	.11533E-12	0.00000	-.18368E-13	0.00000	.13598E-12	0.00000	.13135E+00	0.00000	-.28273E+00	0.00000

NATURAL FREQUENCY= .122981E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.78367E-01	0.00000	.23707E-13	0.00000	-.45343E-13	0.00000	.77456E-13	0.00000	.20985E-01	0.00000	-.26407E+00	0.00000
-.78367E-01	0.00000	-.42136E-13	0.00000	.42150E-13	0.00000	-.11476E-12	0.00000	.20985E-01	0.00000	.26407E+00	0.00000
.40422E-01	0.00000	.20752E-13	0.00000	-.11651E-13	0.00000	.11806E-13	0.00000	-.25758E+00	0.00000	.48215E-02	0.00000
-.40422E-01	0.00000	-.14379E-13	0.00000	.11734E-13	0.00000	-.24666E-13	0.00000	-.25758E+00	0.00000	-.48215E-02	0.00000
.67552E-01	0.00000	-.16546E-13	0.00000	.46781E-13	0.00000	.14087E-13	0.00000	-.82454E-01	0.00000	.54355E-01	0.00000
-.67552E-01	0.00000	.30233E-13	0.00000	.28540E-13	0.00000	.42192E-13	0.00000	-.82454E-01	0.00000	-.54355E-01	0.00000
-.59991E-01	0.00000	.22020E-13	0.00000	-.23773E-13	0.00000	-.74773E-14	0.00000	.76324E-01	0.00000	.10440E+00	0.00000
.59991E-01	0.00000	.56306E-13	0.00000	-.32321E-13	0.00000	.22425E-13	0.00000	.76324E-01	0.00000	-.10440E+00	0.00000
-.12635E+00	0.00000	.21448E-13	0.00000	-.19137E-13	0.00000	-.32245E-13	0.00000	.24272E+00	0.00000	.35903E-01	0.00000
.12635E+00	0.00000	-.33185E-13	0.00000	.34323E-14	0.00000	-.46380E-14	0.00000	.24272E+00	0.00000	-.35903E-01	0.00000
-.12635E+00	0.00000	-.14198E-13	0.00000	.18730E-13	0.00000	-.10334E-13	0.00000	.24272E+00	0.00000	-.35903E-01	0.00000
.12635E+00	0.00000	-.57964E-13	0.00000	.13227E-13	0.00000	-.74384E-14	0.00000	.24272E+00	0.00000	.35903E-01	0.00000
-.59991E-01	0.00000	.17849E-13	0.00000	.58328E-15	0.00000	-.95454E-14	0.00000	.76324E-01	0.00000	-.10440E+00	0.00000
.59991E-01	0.00000	.24900E-13	0.00000	-.75756E-14	0.00000	.89861E-14	0.00000	.76324E-01	0.00000	.10440E+00	0.00000
.67552E-01	0.00000	-.46227E-13	0.00000	.13806E-13	0.00000	.46163E-13	0.00000	-.82454E-01	0.00000	-.54355E-01	0.00000
-.67552E-01	0.00000	.56606E-13	0.00000	.18801E-13	0.00000	.44820E-13	0.00000	-.82454E-01	0.00000	.54355E-01	0.00000
.40422E-01	0.00000	-.51645E-13	0.00000	-.11456E-13	0.00000	.26919E-13	0.00000	-.25758E+00	0.00000	-.48215E-02	0.00000
-.40422E-01	0.00000	.74135E-15	0.00000	-.37699E-13	0.00000	.49775E-13	0.00000	-.25758E+00	0.00000	.48215E-02	0.00000
.78367E-01	0.00000	.50642E-13	0.00000	-.21866E-14	0.00000	-.31241E-13	0.00000	.20985E-01	0.00000	.26407E+00	0.00000
-.78367E-01	0.00000	-.22108E-13	0.00000	.14140E-13	0.00000	-.45319E-13	0.00000	.20985E-01	0.00000	-.26407E+00	0.00000

NATURAL FREQUENCY= .126367E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.98084E-01	0.00000	.47894E-13	0.00000	.23868E-13	0.00000	.99996E-13	0.00000	-.52228E-01	0.00000	-.23950E+00	0.00000
-.98084E-01	0.00000	-.62641E-13	0.00000	-.35084E-13	0.00000	-.25880E-13	0.00000	-.52226E-01	0.00000	.23950E+00	0.00000
.17440E-01	0.00000	.31071E-13	0.00000	.47910E-13	0.00000	-.36884E-13	0.00000	-.21106E+00	0.00000	.76377E-01	0.00000
-.17440E-01	0.00000	.63953E-13	0.00000	.13380E-13	0.00000	-.63331E-14	0.00000	-.21106E+00	0.00000	-.76377E-01	0.00000
-.30720E-01	0.00000	-.11783E-12	0.00000	-.10222E-13	0.00000	.73315E-13	0.00000	.10934E+00	0.00000	.88219E-01	0.00000
.30720E-01	0.00000	.62508E-13	0.00000	-.45662E-13	0.00000	.44971E-13	0.00000	.10934E+00	0.00000	-.88219E-01	0.00000
-.12901E+00	0.00000	-.10621E-12	0.00000	-.24568E-13	0.00000	-.15049E-13	0.00000	.24563E+00	0.00000	.16886E-01	0.00000
.12901E+00	0.00000	-.64074E-13	0.00000	.53608E-15	0.00000	.17825E-13	0.00000	.24563E+00	0.00000	-.16886E-01	0.00000
-.59123E-01	0.00000	.58980E-13	0.00000	-.79893E-14	0.00000	-.16449E-13	0.00000	.14582E+00	0.00000	-.11321E+00	0.00000
.59123E-01	0.00000	-.33661E-13	0.00000	.15738E-13	0.00000	-.35368E-13	0.00000	.14582E+00	0.00000	.11321E+00	0.00000
.59123E-01	0.00000	.90290E-13	0.00000	.23866E-13	0.00000	-.34665E-13	0.00000	-.14582E+00	0.00000	-.11321E+00	0.00000
-.59123E-01	0.00000	.52963E-13	0.00000	.13888E-13	0.00000	-.11096E-13	0.00000	-.14582E+00	0.00000	.11321E+00	0.00000
.12901E+00	0.00000	-.22516E-13	0.00000	-.19169E-13	0.00000	.34284E-13	0.00000	-.24563E+00	0.00000	.16886E-01	0.00000
-.12901E+00	0.00000	.39408E-13	0.00000	-.61469E-14	0.00000	.28416E-13	0.00000	-.24563E+00	0.00000	-.16886E-01	0.00000
.30720E-01	0.00000	-.11099E-12	0.00000	.33034E-13	0.00000	-.16903E-13	0.00000	-.10934E+00	0.00000	.88219E-01	0.00000
-.30720E-01	0.00000	-.24899E-13	0.00000	.20830E-13	0.00000	.72542E-14	0.00000	-.10934E+00	0.00000	-.88219E-01	0.00000
-.17440E-01	0.00000	-.84839E-13	0.00000	-.43312E-13	0.00000	.52268E-13	0.00000	.21106E+00	0.00000	.76377E-01	0.00000
.17440E-01	0.00000	-.40951E-15	0.00000	-.29750E-13	0.00000	.63711E-13	0.00000	.21106E+00	0.00000	-.76377E-01	0.00000
-.98084E-01	0.00000	.10185E-12	0.00000	.16074E-13	0.00000	-.85892E-13	0.00000	.52228E-01	0.00000	-.23950E+00	0.00000
.98084E-01	0.00000	.31934E-13	0.00000	-.78134E-15	0.00000	-.89004E-13	0.00000	.52228E-01	0.00000	.23950E+00	0.00000

NATURAL FREQUENCY= .127844E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.32213E-13	0.00000	-.28233E-13	0.00000	-.59839E-12	0.00000	-.31125E-12	0.00000	.18587E+00	0.00000	.85725E-13	0.00000
.70175E-13	0.00000	.23303E-13	0.00000	.60396E-12	0.00000	.39191E-12	0.00000	-.18587E+00	0.00000	-.10572E-12	0.00000
.50878E-14	0.00000	.27388E-13	0.00000	-.76007E-12	0.00000	.33664E-12	0.00000	-.30075E+00	0.00000	-.92619E-13	0.00000
.73325E-14	0.00000	-.99273E-15	0.00000	.70475E-12	0.00000	-.36278E-12	0.00000	.30075E+00	0.00000	.29451E-13	0.00000
.45851E-13	0.00000	.51840E-13	0.00000	.16594E-12	0.00000	.92174E-12	0.00000	-.20245E-12	0.00000	-.11751E-13	0.00000
.41600E-13	0.00000	-.48040E-13	0.00000	-.15823E-12	0.00000	-.93665E-12	0.00000	-.39650E-13	0.00000	.56229E-13	0.00000
.60386E-13	0.00000	.28080E-13	0.00000	.13018E-11	0.00000	.48566E-12	0.00000	.30075E+00	0.00000	.42354E-13	0.00000
.46197E-13	0.00000	-.64574E-13	0.00000	-.12362E-11	0.00000	-.57047E-12	0.00000	-.30075E+00	0.00000	-.36851E-13	0.00000
.72795E-14	0.00000	-.54069E-13	0.00000	.13463E-11	0.00000	-.35212E-12	0.00000	-.18587E+00	0.00000	.10035E-12	0.00000
.33838E-14	0.00000	.44573E-13	0.00000	-.13057E-11	0.00000	.44741E-12	0.00000	.18587E+00	0.00000	-.65092E-15	0.00000
.13451E-13	0.00000	-.57368E-13	0.00000	.35608E-12	0.00000	-.80113E-12	0.00000	-.18587E+00	0.00000	.46698E-14	0.00000
.45971E-13	0.00000	.62547E-13	0.00000	-.38687E-12	0.00000	.87891E-12	0.00000	.18587E+00	0.00000	-.14266E-14	0.00000
.10556E-13	0.00000	-.93452E-14	0.00000	-.56681E-12	0.00000	-.48634E-12	0.00000	.30075E+00	0.00000	-.26349E-13	0.00000
.31555E-13	0.00000	-.76466E-14	0.00000	.53739E-12	0.00000	.46247E-12	0.00000	-.30075E+00	0.00000	.35907E-13	0.00000
.30535E-13	0.00000	.38718E-13	0.00000	-.68365E-12	0.00000	.17073E-12	0.00000	.11289E-12	0.00000	-.51591E-13	0.00000
.24123E-13	0.00000	-.52034E-13	0.00000	.64481E-12	0.00000	-.17434E-12	0.00000	-.13883E-12	0.00000	-.27306E-13	0.00000
.17009E-13	0.00000	.66819E-13	0.00000	-.12872E-12	0.00000	.17695E-12	0.00000	-.30075E+00	0.00000	-.53496E-14	0.00000
.12385E-13	0.00000	-.46604E-13	0.00000	.22776E-12	0.00000	-.27155E-12	0.00000	.30075E+00	0.00000	-.16715E-13	0.00000
-.36143E-14	0.00000	-.32369E-13	0.00000	-.23052E-12	0.00000	-.27134E-12	0.00000	.18587E+00	0.00000	.79430E-13	0.00000
-.30677E-13	0.00000	.36213E-13	0.00000	.19216E-12	0.00000	.44115E-12	0.00000	-.18587E+00	0.00000	-.75771E-13	0.00000

NATURAL FREQUENCY= .128934E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
17173E-14	0.00000	.10742E-13	0.00000	.10126E+00	0.00000	.88224E-01	0.00000	.75350E-12	0.00000	-.22228E-13	0.00000
57066E-14	0.00000	-.56312E-13	0.00000	-.10126E+00	0.00000	-.88224E-01	0.00000	-.71148E-12	0.00000	.16067E-13	0.00000
85533E-14	0.00000	.94205E-14	0.00000	.11748E+00	0.00000	-.99758E-01	0.00000	-.11709E-11	0.00000	.33702E-13	0.00000
39333E-14	0.00000	.77716E-13	0.00000	-.11748E+00	0.00000	.99758E-01	0.00000	.11839E-11	0.00000	.19893E-13	0.00000
39367E-14	0.00000	.14938E-13	0.00000	-.11557E+00	0.00000	-.19326E+00	0.00000	-.22424E-13	0.00000	.14066E-13	0.00000
10094E-13	0.00000	.68992E-13	0.00000	.11557E+00	0.00000	.19326E+00	0.00000	.40611E-13	0.00000	.43380E-13	0.00000
12497E-13	0.00000	-.24745E-13	0.00000	-.30329E+00	0.00000	-.22734E-01	0.00000	.11118E-11	0.00000	.25371E-14	0.00000
19707E-13	0.00000	-.61137E-13	0.00000	.30329E+00	0.00000	.22734E-01	0.00000	-.11426E-11	0.00000	.10872E-13	0.00000
27487E-13	0.00000	.16713E-13	0.00000	-.16539E+00	0.00000	.21549E+00	0.00000	-.63492E-12	0.00000	.24935E-13	0.00000
28420E-13	0.00000	-.66087E-13	0.00000	.16539E+00	0.00000	-.21549E+00	0.00000	.59693E-12	0.00000	.85806E-14	0.00000
15779E-13	0.00000	.12711E-14	0.00000	.16539E+00	0.00000	.21549E+00	0.00000	-.71512E-12	0.00000	-.16030E-14	0.00000
36564E-14	0.00000	.42162E-13	0.00000	-.16539E+00	0.00000	-.21549E+00	0.00000	.68787E-12	0.00000	-.29118E-13	0.00000
51803E-14	0.00000	-.25027E-13	0.00000	.30329E+00	0.00000	-.22734E-01	0.00000	.10115E-11	0.00000	-.97302E-14	0.00000
17143E-13	0.00000	.66655E-13	0.00000	-.30329E+00	0.00000	.22734E-01	0.00000	-.99559E-12	0.00000	-.21044E-13	0.00000
24006E-13	0.00000	.11768E-13	0.00000	.11557E+00	0.00000	-.19326E+00	0.00000	-.75652E-16	0.00000	.15287E-13	0.00000
22866E-13	0.00000	-.46382E-13	0.00000	-.11557E+00	0.00000	.19326E+00	0.00000	-.51745E-13	0.00000	.38004E-13	0.00000
84324E-14	0.00000	.86683E-14	0.00000	-.11748E+00	0.00000	-.99758E-01	0.00000	-.99461E-12	0.00000	.18793E-13	0.00000
28164E-13	0.00000	-.75632E-13	0.00000	.11748E+00	0.00000	.99758E-01	0.00000	.90880E-12	0.00000	-.43262E-14	0.00000
45942E-13	0.00000	.95016E-14	0.00000	-.10126E+00	0.00000	.88224E-01	0.00000	.55658E-12	0.00000	.18759E-13	0.00000
18766E-13	0.00000	.25735E-13	0.00000	.10126E+00	0.00000	-.88224E-01	0.00000	-.59943E-12	0.00000	.14517E-13	0.00000

NATURAL FREQUENCY= .129083E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.40962E-13	0.00000	-.25507E-13	0.00000	.17858E+00	0.00000	-.54902E-02	0.00000	.46085E-12	0.00000	.92061E-14	0.00000
.84964E-14	0.00000	-.25819E-13	0.00000	-.17858E+00	0.00000	.54902E-02	0.00000	-.39488E-12	0.00000	-.13193E-13	0.00000
.22853E-13	0.00000	.25952E-13	0.00000	.17803E+00	0.00000	-.41619E-01	0.00000	-.70979E-12	0.00000	.10590E-13	0.00000
.71508E-14	0.00000	.26916E-13	0.00000	-.17803E+00	0.00000	.41619E-01	0.00000	.78068E-12	0.00000	.40726E-14	0.00000
.18856E-13	0.00000	.96740E-14	0.00000	.89369E-01	0.00000	-.14003E+00	0.00000	.23470E-13	0.00000	.10487E-13	0.00000
.79105E-14	0.00000	.13066E-13	0.00000	-.89369E-01	0.00000	.14003E+00	0.00000	-.21022E-13	0.00000	.33831E-13	0.00000
.12409E-13	0.00000	-.22318E-13	0.00000	-.12436E+00	0.00000	-.18999E+00	0.00000	.83735E-12	0.00000	-.32274E-13	0.00000
.91141E-14	0.00000	-.48520E-13	0.00000	.12436E+00	0.00000	.18999E+00	0.00000	-.84643E-12	0.00000	-.56569E-13	0.00000
.30928E-13	0.00000	-.38191E-15	0.00000	-.32162E+00	0.00000	-.91139E-01	0.00000	-.57486E-12	0.00000	-.14430E-13	0.00000
.57579E-14	0.00000	-.53064E-13	0.00000	.32162E+00	0.00000	.91139E-01	0.00000	.62568E-12	0.00000	-.22761E-13	0.00000
.14587E-13	0.00000	-.84456E-14	0.00000	-.32162E+00	0.00000	.91139E-01	0.00000	-.51938E-12	0.00000	-.24853E-13	0.00000
.14330E-13	0.00000	.40139E-13	0.00000	.32162E+00	0.00000	-.91139E-01	0.00000	.53485E-12	0.00000	.18368E-13	0.00000
.32744E-13	0.00000	.29251E-14	0.00000	-.12436E+00	0.00000	.18999E+00	0.00000	.89744E-12	0.00000	-.50222E-13	0.00000
.10479E-13	0.00000	.53874E-13	0.00000	.12436E+00	0.00000	-.18999E+00	0.00000	-.96361E-12	0.00000	-.12814E-13	0.00000
.18091E-13	0.00000	-.13532E-14	0.00000	.89369E-01	0.00000	.14003E+00	0.00000	-.66304E-13	0.00000	-.11911E-13	0.00000
.22044E-13	0.00000	-.40285E-13	0.00000	-.89369E-01	0.00000	-.14003E+00	0.00000	-.34240E-13	0.00000	-.12118E-13	0.00000
.20473E-13	0.00000	-.10279E-13	0.00000	.17803E+00	0.00000	.41619E-01	0.00000	-.96347E-12	0.00000	.15552E-13	0.00000
.23150E-13	0.00000	-.60117E-13	0.00000	-.17803E+00	0.00000	-.41619E-01	0.00000	.94514E-12	0.00000	-.67349E-13	0.00000
.94619E-14	0.00000	.41716E-14	0.00000	.17858E+00	0.00000	.54902E-02	0.00000	.62045E-12	0.00000	-.27975E-13	0.00000
.16448E-13	0.00000	.31933E-13	0.00000	-.17858E+00	0.00000	-.54902E-02	0.00000	-.59606E-12	0.00000	.52069E-13	0.00000

NATURAL FREQUENCY= .130794E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.10049E+00	0.00000	-.41099E-13	0.00000	.10796E-11	0.00000	.16441E-12	0.00000	.10272E+00	0.00000	.20403E+00	0.00000
.10049E+00	0.00000	.70111E-14	0.00000	-.10523E-11	0.00000	-.56503E-13	0.00000	.10272E+00	0.00000	-.20403E+00	0.00000
.21424E-01	0.00000	.93472E-13	0.00000	.10633E-11	0.00000	-.20265E-12	0.00000	.10160E+00	0.00000	-.13484E+00	0.00000
-.21424E-01	0.00000	-.16412E-13	0.00000	-.11518E-11	0.00000	.11996E-12	0.00000	.10160E+00	0.00000	.13484E+00	0.00000
.90522E-01	0.00000	-.31341E-13	0.00000	.83841E-12	0.00000	-.23274E-12	0.00000	-.25809E+00	0.00000	-.30901E-01	0.00000
-.90522E-01	0.00000	-.31245E-13	0.00000	-.75149E-12	0.00000	.28908E-12	0.00000	-.25809E+00	0.00000	.30901E-01	0.00000
.64715E-01	0.00000	-.10150E-12	0.00000	.52299E-12	0.00000	-.14694E-12	0.00000	-.13577E+00	0.00000	.11904E+00	0.00000
-.64715E-01	0.00000	.33772E-14	0.00000	-.50403E-12	0.00000	.19908E-12	0.00000	-.13577E+00	0.00000	-.11904E+00	0.00000
-.76170E-01	0.00000	-.28892E-13	0.00000	.37386E-12	0.00000	-.21170E-12	0.00000	.18954E+00	0.00000	.10036E+00	0.00000
.76170E-01	0.00000	.29043E-13	0.00000	-.42552E-12	0.00000	.19021E-12	0.00000	.18954E+00	0.00000	-.10036E+00	0.00000
-.76170E-01	0.00000	.59126E-13	0.00000	.10118E-12	0.00000	-.44204E-12	0.00000	.18954E+00	0.00000	-.10036E+00	0.00000
.76170E-01	0.00000	.53261E-13	0.00000	-.90132E-13	0.00000	.41358E-12	0.00000	.18954E+00	0.00000	.10036E+00	0.00000
.64715E-01	0.00000	.16861E-13	0.00000	-.43739E-12	0.00000	-.42260E-12	0.00000	-.13577E+00	0.00000	-.11904E+00	0.00000
-.64715E-01	0.00000	.77993E-14	0.00000	.45024E-12	0.00000	.42046E-12	0.00000	-.13577E+00	0.00000	.11904E+00	0.00000
.90522E-01	0.00000	-.21833E-13	0.00000	-.82224E-12	0.00000	-.17461E-12	0.00000	-.25809E+00	0.00000	.30901E-01	0.00000
-.90522E-01	0.00000	-.16981E-13	0.00000	.78733E-12	0.00000	.19696E-12	0.00000	-.25809E+00	0.00000	-.30901E-01	0.00000
.21424E-01	0.00000	-.16133E-13	0.00000	-.86771E-12	0.00000	-.49020E-13	0.00000	.10160E+00	0.00000	.13484E+00	0.00000
-.21424E-01	0.00000	-.28298E-13	0.00000	.88139E-12	0.00000	.16768E-13	0.00000	.10160E+00	0.00000	-.13484E+00	0.00000
-.10049E+00	0.00000	.16050E-13	0.00000	-.87166E-12	0.00000	-.32066E-13	0.00000	.10272E+00	0.00000	-.20403E+00	0.00000
.10049E+00	0.00000	.27784E-13	0.00000	.87732E-12	0.00000	.90787E-13	0.00000	.10272E+00	0.00000	.20403E+00	0.00000

NATURAL FREQUENCY= .130990E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.24276E-13	0.00000	-.29207E-12	0.00000	-.28686E+00	0.00000	-.56865E-02	0.00000	.58108E-13	0.00000	.10320E-12	0.00000
.31503E-13	0.00000	-.26224E-12	0.00000	.28686E+00	0.00000	.56865E-02	0.00000	-.72124E-13	0.00000	-.99693E-13	0.00000
-.81041E-14	0.00000	.28053E-12	0.00000	-.28741E+00	0.00000	.30498E-01	0.00000	-.10255E-13	0.00000	-.47392E-13	0.00000
-.20906E-13	0.00000	.25471E-12	0.00000	.28741E+00	0.00000	-.30498E-01	0.00000	.57268E-13	0.00000	.82310E-13	0.00000
.35247E-13	0.00000	.28121E-12	0.00000	-.22474E+00	0.00000	.82947E-01	0.00000	-.21070E-12	0.00000	.91139E-14	0.00000
-.41013E-13	0.00000	.28958E-12	0.00000	.22474E+00	0.00000	-.82947E-01	0.00000	.73335E-15	0.00000	-.62678E-14	0.00000
.70396E-14	0.00000	-.30340E-12	0.00000	-.11771E+00	0.00000	.94718E-01	0.00000	.11175E-12	0.00000	.11258E-12	0.00000
-.23861E-13	0.00000	-.22255E-12	0.00000	.11771E+00	0.00000	-.94718E-01	0.00000	-.17915E-12	0.00000	.32448E-13	0.00000
-.14298E-13	0.00000	-.30630E-12	0.00000	-.31074E-01	0.00000	.72972E-01	0.00000	.16052E-12	0.00000	.51755E-13	0.00000
.65810E-13	0.00000	-.25899E-12	0.00000	.31074E-01	0.00000	-.72972E-01	0.00000	.25330E-14	0.00000	-.23223E-13	0.00000
-.36973E-13	0.00000	.30110E-12	0.00000	.31074E-01	0.00000	.72972E-01	0.00000	-.18051E-12	0.00000	-.43771E-13	0.00000
.32616E-13	0.00000	.23325E-12	0.00000	-.31074E-01	0.00000	-.72972E-01	0.00000	.36823E-12	0.00000	.15587E-13	0.00000
-.22021E-14	0.00000	.32206E-12	0.00000	.11771E+00	0.00000	.94718E-01	0.00000	.80472E-13	0.00000	-.65143E-13	0.00000
-.12944E-13	0.00000	.24218E-12	0.00000	-.11771E+00	0.00000	-.94718E-01	0.00000	-.14892E-12	0.00000	.48238E-13	0.00000
.26996E-13	0.00000	-.28512E-12	0.00000	.22474E+00	0.00000	.82947E-01	0.00000	.74086E-13	0.00000	-.15987E-14	0.00000
-.44103E-13	0.00000	-.23982E-12	0.00000	-.22474E+00	0.00000	-.82947E-01	0.00000	-.29443E-12	0.00000	.10693E-14	0.00000
.73253E-14	0.00000	-.29767E-12	0.00000	.28741E+00	0.00000	.30498E-01	0.00000	-.30831E-12	0.00000	.56264E-13	0.00000
.80640E-14	0.00000	-.25365E-12	0.00000	-.28741E+00	0.00000	-.30498E-01	0.00000	.37460E-12	0.00000	.14370E-13	0.00000
-.31559E-13	0.00000	.27793E-12	0.00000	.28686E+00	0.00000	-.56865E-02	0.00000	.17242E-12	0.00000	-.88191E-13	0.00000
.34096E-13	0.00000	.26082E-12	0.00000	-.28686E+00	0.00000	.56865E-02	0.00000	-.13912E-12	0.00000	.19266E-13	0.00000

NATURAL FREQUENCY= .131635E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.37009E-13	0.00000	-.74687E-01	0.00000	.40734E-01	0.00000	.27751E+00	0.00000	-.45836E-13	0.00000	.16576E-13	0.00000
-.19466E-13	0.00000	.74687E-01	0.00000	.40734E-01	0.00000	.27751E+00	0.00000	-.34610E-13	0.00000	-.29076E-14	0.00000
-.25789E-13	0.00000	.20801E+00	0.00000	-.10883E+00	0.00000	-.18175E+00	0.00000	-.37837E-13	0.00000	.19501E-12	0.00000
-.31963E-13	0.00000	-.20801E+00	0.00000	-.10883E+00	0.00000	-.18175E+00	0.00000	.39638E-13	0.00000	.16611E-12	0.00000
-.65925E-13	0.00000	.94076E-01	0.00000	.90673E-01	0.00000	-.28859E-01	0.00000	.97121E-13	0.00000	.16728E-12	0.00000
.43973E-15	0.00000	-.94076E-01	0.00000	.90673E-01	0.00000	-.28859E-01	0.00000	-.14894E-13	0.00000	.16387E-12	0.00000
-.45921E-13	0.00000	-.16398E+00	0.00000	.22280E-01	0.00000	.96445E-01	0.00000	.52138E-13	0.00000	.31200E-12	0.00000
-.39279E-13	0.00000	.16398E+00	0.00000	.22280E-01	0.00000	.96445E-01	0.00000	.19700E-13	0.00000	.35618E-12	0.00000
-.55554E-14	0.00000	-.14032E+00	0.00000	-.44858E-01	0.00000	.10658E+00	0.00000	-.12258E-12	0.00000	.29129E-12	0.00000
.18702E-13	0.00000	.14032E+00	0.00000	-.44858E-01	0.00000	.10658E+00	0.00000	.33597E-13	0.00000	.29940E-12	0.00000
.19418E-13	0.00000	.14032E+00	0.00000	-.44858E-01	0.00000	-.10658E+00	0.00000	.41459E-13	0.00000	.38563E-12	0.00000
-.13704E-13	0.00000	-.14032E+00	0.00000	-.44858E-01	0.00000	-.10658E+00	0.00000	-.10344E-12	0.00000	.37883E-12	0.00000
.87572E-14	0.00000	.16398E+00	0.00000	.22280E-01	0.00000	-.96445E-01	0.00000	.23558E-13	0.00000	.28080E-12	0.00000
.68764E-13	0.00000	-.16398E+00	0.00000	.22280E-01	0.00000	-.96445E-01	0.00000	.49956E-14	0.00000	.19715E-12	0.00000
-.15639E-13	0.00000	-.94076E-01	0.00000	.90673E-01	0.00000	.28859E-01	0.00000	-.39561E-13	0.00000	.22179E-12	0.00000
.23930E-13	0.00000	.94076E-01	0.00000	.90673E-01	0.00000	.28859E-01	0.00000	.14432E-12	0.00000	.22215E-12	0.00000
.38345E-13	0.00000	-.20801E+00	0.00000	-.10883E+00	0.00000	.18175E+00	0.00000	.53954E-13	0.00000	.11652E-12	0.00000
.74212E-13	0.00000	.20801E+00	0.00000	-.10883E+00	0.00000	.18175E+00	0.00000	-.73904E-13	0.00000	.17075E-12	0.00000
.42152E-13	0.00000	.74687E-01	0.00000	.40734E-01	0.00000	-.27751E+00	0.00000	-.81031E-13	0.00000	.43642E-13	0.00000
.55536E-14	0.00000	-.74687E-01	0.00000	.40734E-01	0.00000	-.27751E+00	0.00000	-.91187E-14	0.00000	-.53478E-13	0.00000

NATURAL FREQUENCY= .131957E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.85573E-14	0.00000	.90445E-01	0.00000	-.20395E+00	0.00000	.68451E-03	0.00000	.84754E-13	0.00000	.63878E-13	0.00000
.13699E-13	0.00000	.90445E-01	0.00000	.20395E+00	0.00000	-.68451E-03	0.00000	-.10853E-12	0.00000	-.43329E-13	0.00000
.41830E-13	0.00000	-.90445E-01	0.00000	-.20395E+00	0.00000	-.68451E-03	0.00000	-.15652E-12	0.00000	-.12989E-12	0.00000
.31184E-14	0.00000	-.90445E-01	0.00000	.20395E+00	0.00000	.68451E-03	0.00000	.14985E-12	0.00000	-.57780E-13	0.00000
.20990E-13	0.00000	-.90445E-01	0.00000	-.20532E+00	0.00000	-.68451E-03	0.00000	.23360E-13	0.00000	-.99280E-13	0.00000
.38779E-13	0.00000	-.90445E-01	0.00000	.20532E+00	0.00000	.68451E-03	0.00000	-.13435E-12	0.00000	-.12578E-12	0.00000
.24912E-13	0.00000	.90445E-01	0.00000	-.20532E+00	0.00000	.68451E-03	0.00000	.38474E-13	0.00000	-.39502E-13	0.00000
.24390E-14	0.00000	.90445E-01	0.00000	.20532E+00	0.00000	-.68451E-03	0.00000	-.40722E-13	0.00000	-.86176E-13	0.00000
.36016E-14	0.00000	.90445E-01	0.00000	-.20395E+00	0.00000	.68451E-03	0.00000	-.12975E-13	0.00000	-.13408E-12	0.00000
.17314E-13	0.00000	.90445E-01	0.00000	.20395E+00	0.00000	-.68451E-03	0.00000	.98866E-13	0.00000	-.14813E-12	0.00000
.24633E-14	0.00000	-.90445E-01	0.00000	-.20395E+00	0.00000	-.68451E-03	0.00000	.18192E-13	0.00000	-.98377E-13	0.00000
.88458E-14	0.00000	-.90445E-01	0.00000	.20395E+00	0.00000	.68451E-03	0.00000	.52135E-13	0.00000	-.71393E-13	0.00000
.11441E-13	0.00000	-.90445E-01	0.00000	-.20532E+00	0.00000	-.68451E-03	0.00000	.24320E-13	0.00000	-.14039E-12	0.00000
.16979E-13	0.00000	-.90445E-01	0.00000	.20532E+00	0.00000	.68451E-03	0.00000	-.66196E-13	0.00000	-.89030E-13	0.00000
.10103E-13	0.00000	.90445E-01	0.00000	-.20532E+00	0.00000	.68451E-03	0.00000	-.89187E-13	0.00000	-.18000E-13	0.00000
.36085E-13	0.00000	.90445E-01	0.00000	.20532E+00	0.00000	-.68451E-03	0.00000	-.19433E-13	0.00000	-.20720E-13	0.00000
.24279E-13	0.00000	.90445E-01	0.00000	-.20395E+00	0.00000	.68451E-03	0.00000	.93417E-14	0.00000	.83332E-14	0.00000
.10687E-13	0.00000	.90445E-01	0.00000	.20395E+00	0.00000	-.68451E-03	0.00000	.17095E-13	0.00000	.59805E-14	0.00000
.18546E-14	0.00000	-.90445E-01	0.00000	-.20395E+00	0.00000	-.68451E-03	0.00000	.19027E-14	0.00000	-.38602E-13	0.00000
.26447E-13	0.00000	-.90445E-01	0.00000	.20395E+00	0.00000	.68451E-03	0.00000	-.65156E-14	0.00000	-.42130E-14	0.00000

NATURAL FREQUENCY= .131957E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.72582E-14	0.00000	-.10485E+00	0.00000	.81717E-01	0.00000	.14225E+00	0.00000	.37078E-13	0.00000	-.79407E-13	0.00000
-.21740E-13	0.00000	-.10485E+00	0.00000	-.81717E-01	0.00000	-.14225E+00	0.00000	-.53896E-13	0.00000	.49648E-13	0.00000
-.42786E-13	0.00000	.10485E+00	0.00000	.81717E-01	0.00000	-.14225E+00	0.00000	-.14397E-12	0.00000	.10464E-12	0.00000
.10310E-13	0.00000	.10485E+00	0.00000	-.81717E-01	0.00000	.14225E+00	0.00000	.11271E-12	0.00000	.20991E-14	0.00000
-.33428E-13	0.00000	.10485E+00	0.00000	-.20279E+00	0.00000	-.14225E+00	0.00000	.18580E-12	0.00000	.40463E-13	0.00000
.41285E-13	0.00000	.10485E+00	0.00000	.20279E+00	0.00000	.14225E+00	0.00000	-.29398E-13	0.00000	.38929E-13	0.00000
-.45464E-13	0.00000	-.10485E+00	0.00000	-.20279E+00	0.00000	.14225E+00	0.00000	.53101E-13	0.00000	.72886E-15	0.00000
-.94999E-14	0.00000	-.10485E+00	0.00000	.20279E+00	0.00000	-.14225E+00	0.00000	.13865E-13	0.00000	.99771E-13	0.00000
.50499E-13	0.00000	-.10485E+00	0.00000	.81717E-01	0.00000	.14225E+00	0.00000	-.27104E-12	0.00000	.44309E-14	0.00000
-.88410E-14	0.00000	-.10485E+00	0.00000	-.81717E-01	0.00000	-.14225E+00	0.00000	.13364E-12	0.00000	.47823E-13	0.00000
.27517E-13	0.00000	.10485E+00	0.00000	.81717E-01	0.00000	-.14225E+00	0.00000	.13500E-12	0.00000	.58292E-13	0.00000
-.12128E-13	0.00000	.10485E+00	0.00000	-.81717E-01	0.00000	.14225E+00	0.00000	-.24676E-12	0.00000	-.53048E-13	0.00000
-.13261E-13	0.00000	.10485E+00	0.00000	-.20279E+00	0.00000	-.14225E+00	0.00000	.19426E-13	0.00000	.35226E-13	0.00000
.10382E-13	0.00000	.10485E+00	0.00000	.20279E+00	0.00000	.14225E+00	0.00000	.94789E-13	0.00000	-.29127E-13	0.00000
.28324E-14	0.00000	-.10485E+00	0.00000	-.20279E+00	0.00000	.14225E+00	0.00000	-.13152E-12	0.00000	.18268E-13	0.00000
.12564E-14	0.00000	-.10485E+00	0.00000	.20279E+00	0.00000	-.14225E+00	0.00000	.18067E-12	0.00000	.66315E-13	0.00000
.16854E-13	0.00000	-.10485E+00	0.00000	.81717E-01	0.00000	.14225E+00	0.00000	.15139E-12	0.00000	.16330E-13	0.00000
-.90031E-14	0.00000	-.10485E+00	0.00000	-.81717E-01	0.00000	-.14225E+00	0.00000	-.29380E-12	0.00000	.12876E-13	0.00000
.55185E-13	0.00000	.10485E+00	0.00000	.81717E-01	0.00000	-.14225E+00	0.00000	-.11008E-12	0.00000	.45012E-13	0.00000
-.20257E-13	0.00000	.10485E+00	0.00000	-.81717E-01	0.00000	.14225E+00	0.00000	.85700E-13	0.00000	-.33369E-13	0.00000

NATURAL FREQUENCY= .131957E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.36432E-14	0.00000	-.16324E+00	0.00000	-.15333E+00	0.00000	-.10121E+00	0.00000	-.11639E-12	0.00000	.20548E-13	0.00000
.32605E-14	0.00000	-.16324E+00	0.00000	.15333E+00	0.00000	.10121E+00	0.00000	.70812E-13	0.00000	-.14692E-13	0.00000
.67902E-15	0.00000	.16324E+00	0.00000	-.15333E+00	0.00000	.10121E+00	0.00000	.25889E-12	0.00000	-.31205E-13	0.00000
.36938E-14	0.00000	.16324E+00	0.00000	.15333E+00	0.00000	-.10121E+00	0.00000	-.27139E-12	0.00000	-.11467E-13	0.00000
.89728E-14	0.00000	.16324E+00	0.00000	.49082E-01	0.00000	.10121E+00	0.00000	-.14228E-12	0.00000	-.14097E-14	0.00000
.77176E-14	0.00000	.16324E+00	0.00000	-.49082E-01	0.00000	-.10121E+00	0.00000	.17730E-12	0.00000	-.26804E-13	0.00000
.19278E-14	0.00000	-.16324E+00	0.00000	.49082E-01	0.00000	-.10121E+00	0.00000	-.42967E-13	0.00000	-.36254E-13	0.00000
.58490E-15	0.00000	-.16324E+00	0.00000	-.49082E-01	0.00000	.10121E+00	0.00000	.53282E-13	0.00000	.53567E-14	0.00000
.12638E-14	0.00000	-.16324E+00	0.00000	-.15333E+00	0.00000	-.10121E+00	0.00000	.20102E-12	0.00000	-.11903E-13	0.00000
.15223E-13	0.00000	-.16324E+00	0.00000	.15333E+00	0.00000	.10121E+00	0.00000	-.24763E-12	0.00000	.22112E-15	0.00000
.84892E-14	0.00000	.16324E+00	0.00000	-.15333E+00	0.00000	.10121E+00	0.00000	-.21171E-12	0.00000	-.49472E-13	0.00000
.57766E-14	0.00000	.16324E+00	0.00000	.15333E+00	0.00000	-.10121E+00	0.00000	.22982E-12	0.00000	-.47582E-13	0.00000
.14053E-13	0.00000	.16324E+00	0.00000	.49082E-01	0.00000	.10121E+00	0.00000	.30722E-13	0.00000	-.41271E-13	0.00000
.24156E-13	0.00000	.16324E+00	0.00000	-.49082E-01	0.00000	-.10121E+00	0.00000	.19490E-13	0.00000	-.38742E-13	0.00000
.97999E-14	0.00000	-.16324E+00	0.00000	.49082E-01	0.00000	-.10121E+00	0.00000	.24146E-12	0.00000	-.10986E-12	0.00000
.95944E-14	0.00000	-.16324E+00	0.00000	-.49082E-01	0.00000	.10121E+00	0.00000	-.20206E-12	0.00000	-.96481E-13	0.00000
.43749E-13	0.00000	-.16324E+00	0.00000	-.15333E+00	0.00000	-.10121E+00	0.00000	-.28262E-12	0.00000	-.63489E-13	0.00000
.15452E-13	0.00000	-.16324E+00	0.00000	.15333E+00	0.00000	.10121E+00	0.00000	.32114E-12	0.00000	-.17385E-14	0.00000
.13841E-13	0.00000	.16324E+00	0.00000	-.15333E+00	0.00000	.10121E+00	0.00000	.18841E-12	0.00000	.23169E-13	0.00000
.90625E-15	0.00000	.16324E+00	0.00000	.15333E+00	0.00000	-.10121E+00	0.00000	-.99056E-13	0.00000	-.43252E-13	0.00000

NATURAL FREQUENCY= .132494E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.24521E-01	0.00000	.74357E-13	0.00000	-.10987E-12	0.00000	.20051E-12	0.00000	-.31807E-12	0.00000	-.78565E-02	0.00000
.24521E-01	0.00000	.10035E-12	0.00000	.16521E-12	0.00000	-.13173E-12	0.00000	-.14546E-12	0.00000	-.78565E-02	0.00000
.39200E-01	0.00000	-.83405E-13	0.00000	-.78113E-13	0.00000	-.75607E-13	0.00000	-.33399E-12	0.00000	.17215E+00	0.00000
.39200E-01	0.00000	-.98214E-13	0.00000	.59377E-13	0.00000	.69580E-13	0.00000	-.23313E-12	0.00000	.17215E+00	0.00000
.14268E-01	0.00000	-.30864E-13	0.00000	-.25301E-12	0.00000	-.11651E-12	0.00000	.65237E-12	0.00000	.19171E+00	0.00000
.14268E-01	0.00000	-.16006E-12	0.00000	.24343E-12	0.00000	.94158E-14	0.00000	.43257E-12	0.00000	.19171E+00	0.00000
.25497E-01	0.00000	.13472E-12	0.00000	-.19798E-12	0.00000	-.17786E-13	0.00000	.34657E-12	0.00000	.29537E+00	0.00000
.25497E-01	0.00000	.25452E-13	0.00000	.23934E-12	0.00000	-.88201E-13	0.00000	.33270E-12	0.00000	.29537E+00	0.00000
.49055E-02	0.00000	-.18555E-13	0.00000	-.13905E-12	0.00000	.19350E-12	0.00000	-.54446E-12	0.00000	.30565E+00	0.00000
.49055E-02	0.00000	.13793E-12	0.00000	.15616E-12	0.00000	.24111E-13	0.00000	-.33742E-12	0.00000	.30565E+00	0.00000
.49055E-02	0.00000	-.74137E-13	0.00000	-.14939E-12	0.00000	.11925E-13	0.00000	-.45433E-12	0.00000	.30565E+00	0.00000
.49055E-02	0.00000	-.10827E-13	0.00000	.72359E-13	0.00000	-.87647E-14	0.00000	-.60662E-12	0.00000	.30565E+00	0.00000
.25497E-01	0.00000	.12295E-13	0.00000	-.15150E-12	0.00000	-.84440E-13	0.00000	.30299E-12	0.00000	.29537E+00	0.00000
.25497E-01	0.00000	-.10360E-12	0.00000	.15612E-12	0.00000	-.58230E-14	0.00000	.33895E-12	0.00000	.29537E+00	0.00000
.14268E-01	0.00000	.82943E-13	0.00000	-.17863E-12	0.00000	-.31792E-13	0.00000	.73960E-12	0.00000	.19171E+00	0.00000
.14268E-01	0.00000	-.18246E-13	0.00000	.18965E-12	0.00000	-.13331E-12	0.00000	.86485E-12	0.00000	.19171E+00	0.00000
.39200E-01	0.00000	-.58543E-14	0.00000	-.54978E-13	0.00000	.12098E-12	0.00000	-.94311E-13	0.00000	.17215E+00	0.00000
.39200E-01	0.00000	.12976E-12	0.00000	.64446E-13	0.00000	-.24032E-13	0.00000	-.30293E-12	0.00000	.17215E+00	0.00000
.24521E-01	0.00000	-.75885E-13	0.00000	-.37832E-13	0.00000	-.93201E-13	0.00000	-.26610E-12	0.00000	-.78565E-02	0.00000
.24521E-01	0.00000	-.17538E-13	0.00000	.51844E-13	0.00000	-.13502E-12	0.00000	-.17771E-12	0.00000	-.78565E-02	0.00000

NATURAL FREQUENCY= .134055E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.14317E-12	0.00000	-.11342E-12	0.00000	-.33864E-12	0.00000	-.16813E-12	0.00000	.14356E+00	0.00000	.12859E-12	0.00000
.76678E-13	0.00000	-.10604E-12	0.00000	.35971E-12	0.00000	.19779E-12	0.00000	-.14356E+00	0.00000	.21067E-13	0.00000
.81030E-13	0.00000	.14857E-12	0.00000	-.34765E-12	0.00000	.25470E-12	0.00000	-.31233E+00	0.00000	.38792E-12	0.00000
.44738E-13	0.00000	.13655E-12	0.00000	.33811E-12	0.00000	-.23776E-12	0.00000	.31233E+00	0.00000	.49940E-12	0.00000
.37348E-13	0.00000	.15765E-12	0.00000	.15415E-12	0.00000	.26283E-12	0.00000	.22361E+00	0.00000	.41109E-13	0.00000
-.11206E-12	0.00000	.91961E-13	0.00000	-.16856E-12	0.00000	-.28308E-12	0.00000	-.22361E+00	0.00000	-.23349E-13	0.00000
.62300E-13	0.00000	-.10388E-12	0.00000	.21881E-12	0.00000	-.19599E-12	0.00000	.49467E-01	0.00000	.65812E-12	0.00000
.94074E-13	0.00000	-.13998E-12	0.00000	-.16640E-12	0.00000	.16984E-12	0.00000	-.49469E-01	0.00000	.54419E-12	0.00000
.41856E-14	0.00000	-.14995E-12	0.00000	-.21413E-12	0.00000	-.10799E-12	0.00000	-.28176E+00	0.00000	-.33984E-12	0.00000
.38366E-13	0.00000	-.86723E-13	0.00000	.19146E-12	0.00000	.16157E-12	0.00000	.28176E+00	0.00000	-.25911E-12	0.00000
.95731E-13	0.00000	.10045E-12	0.00000	-.12665E-12	0.00000	.26229E-12	0.00000	.28176E+00	0.00000	.33763E-12	0.00000
.31897E-13	0.00000	.13751E-12	0.00000	.10778E-12	0.00000	-.21755E-12	0.00000	-.28176E+00	0.00000	.37402E-12	0.00000
.81284E-13	0.00000	.16501E-12	0.00000	.24918E-12	0.00000	.15268E-12	0.00000	-.49469E-01	0.00000	-.61557E-12	0.00000
.73673E-13	0.00000	.91927E-13	0.00000	-.27862E-12	0.00000	-.25144E-12	0.00000	.49469E-01	0.00000	-.73732E-12	0.00000
-.63773E-13	0.00000	-.11775E-12	0.00000	.32805E-12	0.00000	-.10324E-12	0.00000	-.22361E+00	0.00000	.27109E-13	0.00000
-.26242E-13	0.00000	-.11164E-12	0.00000	-.27493E-12	0.00000	.12150E-12	0.00000	.22361E+00	0.00000	-.38530E-14	0.00000
.77819E-13	0.00000	-.16356E-12	0.00000	.23604E-13	0.00000	-.93367E-13	0.00000	.31233E+00	0.00000	-.65457E-12	0.00000
.74169E-13	0.00000	-.80416E-13	0.00000	-.46533E-13	0.00000	.16398E-12	0.00000	-.31233E+00	0.00000	-.57450E-12	0.00000
-.14601E-12	0.00000	.14205E-12	0.00000	.53041E-13	0.00000	.57997E-13	0.00000	-.14356E+00	0.00000	-.56601E-13	0.00000
-.18673E-12	0.00000	.15162E-12	0.00000	-.40770E-13	0.00000	-.17655E-12	0.00000	.14356E+00	0.00000	-.13517E-12	0.00000

NATURAL FREQUENCY= .134105E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.74168E-01	0.00000	.32450E-13	0.00000	-.37061E-13	0.00000	-.13123E-12	0.00000	-.13887E-14	0.00000	.51985E-01	0.00000
-.74163E-01	0.00000	.30078E-16	0.00000	.26916E-13	0.00000	-.77961E-14	0.00000	.11165E-11	0.00000	.51985E-01	0.00000
.40623E-01	0.00000	-.10316E-12	0.00000	.65302E-14	0.00000	.71026E-13	0.00000	.95074E-12	0.00000	.29684E+00	0.00000
.40623E-01	0.00000	.27315E-13	0.00000	.16470E-13	0.00000	.37786E-13	0.00000	-.15013E-11	0.00000	.29684E+00	0.00000
.29392E-01	0.00000	-.57093E-13	0.00000	-.25373E-13	0.00000	.27981E-13	0.00000	-.18867E-11	0.00000	-.17137E-01	0.00000
.29392E-01	0.00000	.59864E-13	0.00000	-.99931E-14	0.00000	.63305E-13	0.00000	-.16872E-12	0.00000	-.17137E-01	0.00000
.43572E-01	0.00000	.10304E-12	0.00000	-.19394E-13	0.00000	.54341E-13	0.00000	.50612E-12	0.00000	.33758E+00	0.00000
.43572E-01	0.00000	.17018E-13	0.00000	-.36841E-13	0.00000	-.48439E-13	0.00000	.10671E-11	0.00000	.33758E+00	0.00000
.19365E-01	0.00000	.40816E-13	0.00000	.53423E-13	0.00000	-.52977E-13	0.00000	.19062E-11	0.00000	-.19233E+00	0.00000
.19365E-01	0.00000	-.62331E-13	0.00000	.24552E-13	0.00000	-.63202E-15	0.00000	-.41680E-12	0.00000	-.19233E+00	0.00000
.19365E-01	0.00000	-.74049E-13	0.00000	.77389E-15	0.00000	.27357E-13	0.00000	-.22125E-11	0.00000	.19233E+00	0.00000
.19365E-01	0.00000	-.36188E-13	0.00000	-.32193E-13	0.00000	-.39235E-14	0.00000	.84746E-13	0.00000	.19233E+00	0.00000
.43572E-01	0.00000	-.77461E-14	0.00000	.25593E-13	0.00000	.16357E-13	0.00000	-.25118E-12	0.00000	-.33758E+00	0.00000
.43572E-01	0.00000	.81311E-13	0.00000	-.27403E-13	0.00000	.12816E-13	0.00000	-.72704E-12	0.00000	-.33758E+00	0.00000
-.29392E-01	0.00000	.25058E-13	0.00000	-.37491E-15	0.00000	.72044E-13	0.00000	.22807E-11	0.00000	.17137E-01	0.00000
-.29392E-01	0.00000	.24627E-13	0.00000	-.79015E-14	0.00000	.53603E-14	0.00000	.61191E-12	0.00000	.17137E-01	0.00000
.40623E-01	0.00000	.55858E-13	0.00000	.36202E-13	0.00000	-.12509E-12	0.00000	-.11658E-11	0.00000	-.29684E+00	0.00000
.40623E-01	0.00000	-.95571E-13	0.00000	.10097E-13	0.00000	-.51945E-13	0.00000	.13618E-11	0.00000	-.29684E+00	0.00000
-.74168E-01	0.00000	-.29682E-13	0.00000	-.31320E-13	0.00000	.58126E-13	0.00000	-.10213E-12	0.00000	-.51985E-01	0.00000
-.74168E-01	0.00000	-.11876E-14	0.00000	-.31547E-14	0.00000	.18644E-12	0.00000	-.12890E-11	0.00000	-.51985E-01	0.00000

NATURAL FREQUENCY= .135881E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.19340E-03	0.00000	.99542E-15	0.00000	.29362E-13	0.00000	.70615E-13	0.00000	-.26549E-11	0.00000	.45164E-01	0.00000
.19340E-03	0.00000	-.69486E-13	0.00000	-.62154E-14	0.00000	-.12316E-12	0.00000	-.26389E-11	0.00000	.45164E-01	0.00000
.10141E+00	0.00000	.21892E-13	0.00000	.55597E-13	0.00000	.61437E-13	0.00000	.59637E-12	0.00000	-.14762E+00	0.00000
.10141E+00	0.00000	.45699E-13	0.00000	-.38253E-13	0.00000	-.24877E-13	0.00000	.53307E-12	0.00000	-.14762E+00	0.00000
.41078E-01	0.00000	.24854E-13	0.00000	.72068E-13	0.00000	-.52867E-13	0.00000	.53648E-11	0.00000	-.36194E+00	0.00000
.41078E-01	0.00000	-.10798E-13	0.00000	-.11421E-12	0.00000	.42756E-13	0.00000	.55435E-11	0.00000	-.36194E+00	0.00000
.50639E-02	0.00000	-.22953E-13	0.00000	.30475E-13	0.00000	.18202E-13	0.00000	-.27473E-11	0.00000	-.72642E-01	0.00000
.50639E-02	0.00000	-.33884E-13	0.00000	-.10985E-13	0.00000	.42953E-13	0.00000	-.29312E-11	0.00000	-.72642E-01	0.00000
.65593E-01	0.00000	.37853E-13	0.00000	.44720E-13	0.00000	.11493E-14	0.00000	-.41300E-11	0.00000	-.27764E+00	0.00000
.65593E-01	0.00000	.52532E-14	0.00000	-.87930E-13	0.00000	-.31736E-13	0.00000	-.38559E-11	0.00000	-.27764E+00	0.00000
.65593E-01	0.00000	.35232E-13	0.00000	.14421E-13	0.00000	-.95231E-13	0.00000	.40725E-11	0.00000	.27764E+00	0.00000
.65593E-01	0.00000	.26437E-13	0.00000	-.38932E-14	0.00000	.63303E-13	0.00000	.38396E-11	0.00000	.27764E+00	0.00000
.50639E-02	0.00000	-.26947E-13	0.00000	-.35176E-13	0.00000	.52679E-13	0.00000	.28056E-11	0.00000	.72642E-01	0.00000
.50639E-02	0.00000	-.21397E-13	0.00000	.85852E-14	0.00000	-.64937E-13	0.00000	.29395E-11	0.00000	.72642E-01	0.00000
.41078E-01	0.00000	-.14622E-13	0.00000	.10509E-12	0.00000	.32922E-13	0.00000	-.53694E-11	0.00000	.36194E+00	0.00000
.41078E-01	0.00000	-.24060E-13	0.00000	-.82945E-13	0.00000	-.45469E-13	0.00000	-.54829E-11	0.00000	.36194E+00	0.00000
.10141E+00	0.00000	.59016E-14	0.00000	.88925E-14	0.00000	-.45535E-13	0.00000	-.61727E-12	0.00000	.14762E+00	0.00000
.10141E+00	0.00000	.48773E-13	0.00000	-.29371E-13	0.00000	.12827E-12	0.00000	-.50493E-12	0.00000	.14762E+00	0.00000
.19340E-03	0.00000	-.19661E-13	0.00000	-.47117E-13	0.00000	.24943E-13	0.00000	.26630E-11	0.00000	-.45164E-01	0.00000
.19340E-03	0.00000	-.20068E-13	0.00000	.77682E-13	0.00000	-.77530E-13	0.00000	.26737E-11	0.00000	-.45164E-01	0.00000

NATURAL FREQUENCY= .13589E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.92605E-01	0.00000	.51142E-13	0.00000	.28252E-14	0.00000	-.82734E-13	0.00000	-.12691E+00	0.00000	-.16482E+00	0.00000
.92605E-01	0.00000	.16992E-13	0.00000	-.41267E-13	0.00000	.15594E-12	0.00000	-.12691E+00	0.00000	.16482E+00	0.00000
.57432E-01	0.00000	-.11011E-13	0.00000	-.36519E-13	0.00000	-.28462E-13	0.00000	.27056E-01	0.00000	.15945E+00	0.00000
.57432E-01	0.00000	-.76857E-13	0.00000	-.24990E-13	0.00000	-.14263E-13	0.00000	.27056E-01	0.00000	-.15945E+00	0.00000
.83393E-01	0.00000	.24839E-14	0.00000	-.56665E-14	0.00000	.18519E-13	0.00000	.25971E+00	0.00000	-.89203E-01	0.00000
.83393E-01	0.00000	-.30048E-13	0.00000	.47345E-13	0.00000	.34942E-13	0.00000	.25971E+00	0.00000	.89203E-01	0.00000
.39957E-01	0.00000	.12932E-13	0.00000	.33461E-13	0.00000	.59797E-13	0.00000	-.13664E+00	0.00000	-.14076E+00	0.00000
.39957E-01	0.00000	.24539E-13	0.00000	.17665E-13	0.00000	.95064E-14	0.00000	-.13664E+00	0.00000	.14076E+00	0.00000
.70130E-01	0.00000	.13288E-13	0.00000	.70542E-14	0.00000	.99626E-15	0.00000	-.19046E+00	0.00000	.10068E+00	0.00000
.70130E-01	0.00000	.23252E-13	0.00000	-.20692E-13	0.00000	.19939E-13	0.00000	-.19046E+00	0.00000	-.10068E+00	0.00000
.70130E-01	0.00000	-.58410E-13	0.00000	.27817E-13	0.00000	.75320E-13	0.00000	.19046E+00	0.00000	.10068E+00	0.00000
.70130E-01	0.00000	.65105E-13	0.00000	.12508E-13	0.00000	.47959E-13	0.00000	.19046E+00	0.00000	-.10068E+00	0.00000
.39957E-01	0.00000	.25739E-13	0.00000	-.34132E-13	0.00000	-.32245E-13	0.00000	.13664E+00	0.00000	-.14076E+00	0.00000
.39957E-01	0.00000	-.10174E-13	0.00000	-.41906E-13	0.00000	-.25693E-13	0.00000	.13664E+00	0.00000	.14076E+00	0.00000
.83393E-01	0.00000	.11949E-14	0.00000	-.20275E-14	0.00000	-.45468E-13	0.00000	-.25971E+00	0.00000	-.89203E-01	0.00000
.83393E-01	0.00000	-.75746E-13	0.00000	.16744E-13	0.00000	-.49475E-13	0.00000	-.25971E+00	0.00000	.89203E-01	0.00000
.57432E-01	0.00000	-.53199E-13	0.00000	-.57404E-14	0.00000	.64004E-13	0.00000	-.27056E-01	0.00000	.15945E+00	0.00000
.57432E-01	0.00000	.39208E-13	0.00000	-.19822E-13	0.00000	.67022E-13	0.00000	-.27056E-01	0.00000	-.15945E+00	0.00000
.92605E-01	0.00000	.14076E-13	0.00000	.10875E-13	0.00000	-.14602E-12	0.00000	.12691E+00	0.00000	-.16482E+00	0.00000
.92605E-01	0.00000	.27339E-13	0.00000	.82664E-14	0.00000	-.60159E-13	0.00000	.12691E+00	0.00000	.16482E+00	0.00000

NATURAL FREQUENCY= .137313E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.10392E-12	0.00000	.27122E-13	0.00000	.11096E+00	0.00000	.19600E+00	0.00000	.15149E-12	0.00000	.34938E-13	0.00000
.39732E-13	0.00000	-.38959E-14	0.00000	-.11096E+00	0.00000	-.19600E+00	0.00000	-.87910E-13	0.00000	-.19054E-13	0.00000
.71073E-14	0.00000	.11259E-12	0.00000	.45549E-01	0.00000	-.20579E+00	0.00000	-.34344E-12	0.00000	.46165E-12	0.00000
.34917E-13	0.00000	-.11844E-12	0.00000	-.45549E-01	0.00000	.20579E+00	0.00000	.35355E-12	0.00000	.52925E-12	0.00000
.13467E-12	0.00000	-.62176E-13	0.00000	-.23359E+00	0.00000	.51021E-02	0.00000	.25964E-12	0.00000	.15595E-12	0.00000
.98002E-13	0.00000	.39268E-13	0.00000	.23359E+00	0.00000	-.51021E-02	0.00000	-.38121E-12	0.00000	.99706E-13	0.00000
.30811E-13	0.00000	-.57058E-13	0.00000	.53720E-01	0.00000	.24357E+00	0.00000	-.86638E-13	0.00000	.30593E-13	0.00000
.25013E-13	0.00000	.11836E-12	0.00000	-.53720E-01	0.00000	-.24357E+00	0.00000	.15825E-12	0.00000	-.47790E-13	0.00000
.10539E-12	0.00000	.57816E-13	0.00000	.17329E+00	0.00000	-.13571E+00	0.00000	-.40912E-13	0.00000	-.18580E-12	0.00000
.12710E-12	0.00000	-.87539E-14	0.00000	-.17329E+00	0.00000	.13571E+00	0.00000	-.13410E-12	0.00000	-.13495E-12	0.00000
.51093E-13	0.00000	.26433E-13	0.00000	-.17329E+00	0.00000	-.13571E+00	0.00000	.15515E-12	0.00000	-.42846E-12	0.00000
.10043E-12	0.00000	-.68926E-13	0.00000	.17329E+00	0.00000	.13571E+00	0.00000	-.27972E-12	0.00000	-.41133E-12	0.00000
.42169E-13	0.00000	-.94223E-13	0.00000	-.53720E-01	0.00000	.24357E+00	0.00000	-.25157E-12	0.00000	.17230E-12	0.00000
.56257E-13	0.00000	.74667E-13	0.00000	.53720E-01	0.00000	-.24357E+00	0.00000	.17885E-12	0.00000	.58385E-13	0.00000
.74405E-13	0.00000	-.12661E-13	0.00000	.23359E+00	0.00000	.51021E-02	0.00000	.19890E-12	0.00000	-.54365E-13	0.00000
.88958E-14	0.00000	.89030E-13	0.00000	-.23359E+00	0.00000	-.51021E-02	0.00000	-.72171E-13	0.00000	-.12674E-12	0.00000
.66957E-13	0.00000	.15308E-12	0.00000	-.45549E-01	0.00000	-.20579E+00	0.00000	-.56116E-13	0.00000	.34375E-12	0.00000
.49639E-13	0.00000	-.94585E-13	0.00000	.45549E-01	0.00000	.20579E+00	0.00000	.81928E-13	0.00000	.40029E-12	0.00000
.12476E-12	0.00000	-.64996E-14	0.00000	-.11096E+00	0.00000	.19600E+00	0.00000	-.37163E-13	0.00000	.99640E-13	0.00000
.60024E-13	0.00000	-.36208E-13	0.00000	.11096E+00	0.00000	-.19600E+00	0.00000	-.82312E-13	0.00000	.20286E-13	0.00000

NATURAL FREQUENCY= .137652E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.84676E-01	0.00000	-.54540E-13	0.00000	.36809E-13	0.00000	.65241E-13	0.00000	.54919E-12	0.00000	-.45620E-01	0.00000
.84676E-01	0.00000	-.94677E-15	0.00000	.13741E-13	0.00000	.32440E-13	0.00000	.50311E-12	0.00000	-.45620E-01	0.00000
-.27462E-01	0.00000	.22026E-13	0.00000	-.75371E-13	0.00000	-.42474E-13	0.00000	-.88181E-13	0.00000	-.39990E+00	0.00000
-.27462E-01	0.00000	.17965E-13	0.00000	-.13124E-13	0.00000	.53620E-13	0.00000	-.99146E-13	0.00000	-.39990E+00	0.00000
-.64429E-01	0.00000	.10181E-12	0.00000	-.59509E-13	0.00000	-.50751E-13	0.00000	-.12515E-11	0.00000	.60068E-01	0.00000
-.64429E-01	0.00000	-.33195E-13	0.00000	.10058E-12	0.00000	-.91999E-13	0.00000	-.11580E-11	0.00000	.60068E-01	0.00000
-.91139E-02	0.00000	-.68200E-14	0.00000	-.25413E-14	0.00000	.94207E-14	0.00000	.55636E-12	0.00000	-.67867E-01	0.00000
-.91139E-02	0.00000	.16280E-13	0.00000	.16896E-13	0.00000	-.35417E-13	0.00000	.53321E-12	0.00000	-.67867E-01	0.00000
-.87030E-01	0.00000	-.77323E-13	0.00000	.12735E-13	0.00000	-.13664E-13	0.00000	.12227E-11	0.00000	.25332E+00	0.00000
-.87030E-01	0.00000	.46416E-13	0.00000	-.27099E-13	0.00000	.82492E-13	0.00000	.12769E-11	0.00000	.25332E+00	0.00000
.87030E-01	0.00000	-.23108E-13	0.00000	-.41973E-13	0.00000	-.29860E-13	0.00000	-.94816E-12	0.00000	.25332E+00	0.00000
.87030E-01	0.00000	-.11019E-13	0.00000	.13416E-13	0.00000	-.10116E-14	0.00000	-.95828E-12	0.00000	.25332E+00	0.00000
.91139E-02	0.00000	.31137E-13	0.00000	-.89670E-14	0.00000	-.40859E-14	0.00000	-.11687E-11	0.00000	-.67867E-01	0.00000
.91139E-02	0.00000	-.22350E-13	0.00000	.28812E-13	0.00000	-.58093E-13	0.00000	-.12128E-11	0.00000	-.67867E-01	0.00000
.64429E-01	0.00000	.23568E-13	0.00000	.44722E-13	0.00000	.17821E-13	0.00000	.15043E-11	0.00000	.60068E-01	0.00000
.64429E-01	0.00000	.73067E-14	0.00000	-.44438E-13	0.00000	.48794E-13	0.00000	.15942E-11	0.00000	.60068E-01	0.00000
.27462E-01	0.00000	.42992E-13	0.00000	-.18997E-13	0.00000	-.84821E-13	0.00000	.44879E-12	0.00000	-.39990E+00	0.00000
.27462E-01	0.00000	-.40731E-13	0.00000	.51665E-13	0.00000	.11633E-13	0.00000	.34466E-12	0.00000	-.39990E+00	0.00000
-.84676E-01	0.00000	-.11488E-13	0.00000	-.71131E-14	0.00000	.68219E-13	0.00000	-.96246E-12	0.00000	-.45620E-01	0.00000
-.84676E-01	0.00000	.33506E-14	0.00000	-.17216E-13	0.00000	.44452E-13	0.00000	-.89705E-12	0.00000	-.45620E-01	0.00000

NATURAL FREQUENCY= .138786E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.67064E-13	0.00000	-.12871E-13	0.00000	-.73916E-13	0.00000	-.10222E-12	0.00000	.97720E-01	0.00000	.25680E-13	0.00000
-.18946E-13	0.00000	.13139E-14	0.00000	.80165E-13	0.00000	.20922E-12	0.00000	-.97720E-01	0.00000	-.23624E-13	0.00000
-.24617E-13	0.00000	.39425E-13	0.00000	.20324E-13	0.00000	.19203E-12	0.00000	-.25583E+00	0.00000	.16683E-12	0.00000
-.27787E-13	0.00000	-.50760E-13	0.00000	-.61650E-13	0.00000	-.23482E-12	0.00000	.25583E+00	0.00000	.23635E-12	0.00000
.42843E-13	0.00000	-.16308E-13	0.00000	.32887E-12	0.00000	-.98255E-13	0.00000	.31623E+00	0.00000	.13733E-12	0.00000
.58768E-14	0.00000	-.10492E-14	0.00000	-.28450E-12	0.00000	.91845E-13	0.00000	-.31623E+00	0.00000	.74555E-13	0.00000
.15839E-13	0.00000	-.60555E-13	0.00000	-.64584E-13	0.00000	-.18290E-12	0.00000	-.25583E+00	0.00000	.28744E-13	0.00000
.41043E-13	0.00000	.66768E-13	0.00000	.53119E-13	0.00000	.33753E-12	0.00000	.25583E+00	0.00000	.29761E-13	0.00000
.60777E-13	0.00000	.25786E-13	0.00000	-.15799E-12	0.00000	.10429E-12	0.00000	.97720E-01	0.00000	-.18406E-12	0.00000
.40915E-13	0.00000	-.44958E-13	0.00000	.10485E-12	0.00000	-.17135E-12	0.00000	-.97720E-01	0.00000	-.16812E-12	0.00000
-.35868E-13	0.00000	.40204E-13	0.00000	.17824E-12	0.00000	.19960E-13	0.00000	.97720E-01	0.00000	-.16309E-12	0.00000
-.27774E-13	0.00000	-.57217E-13	0.00000	-.14636E-12	0.00000	-.98989E-13	0.00000	-.97720E-01	0.00000	-.27036E-12	0.00000
-.77869E-13	0.00000	-.38460E-13	0.00000	.36630E-13	0.00000	-.17314E-12	0.00000	-.25583E+00	0.00000	-.35582E-13	0.00000
-.17912E-13	0.00000	.40976E-13	0.00000	.16218E-13	0.00000	.23285E-12	0.00000	.25583E+00	0.00000	-.10330E-13	0.00000
-.14059E-13	0.00000	-.30671E-13	0.00000	-.20060E-12	0.00000	.41462E-13	0.00000	.31623E+00	0.00000	.84418E-13	0.00000
-.88301E-13	0.00000	.14878E-13	0.00000	.14230E-12	0.00000	.16882E-13	0.00000	-.31623E+00	0.00000	.18038E-12	0.00000
.63578E-13	0.00000	.26668E-13	0.00000	.64879E-13	0.00000	.11420E-12	0.00000	-.25583E+00	0.00000	.36802E-12	0.00000
.21163E-13	0.00000	-.66138E-13	0.00000	-.22374E-13	0.00000	-.19757E-12	0.00000	.25583E+00	0.00000	.24222E-12	0.00000
.13849E-13	0.00000	.47801E-14	0.00000	.95631E-13	0.00000	-.33026E-13	0.00000	.97720E-01	0.00000	-.48711E-13	0.00000
.81435E-13	0.00000	-.51233E-14	0.00000	-.12306E-12	0.00000	.17573E-12	0.00000	-.97720E-01	0.00000	.63457E-13	0.00000

NATURAL FREQUENCY= .140128E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.20156E-01	0.00000	.25604E-12	0.00000	.16644E-12	0.00000	.16524E-11	0.00000	.38080E-12	0.00000	.51989E-01	0.00000
.20156E-01	0.00000	-.22629E-12	0.00000	.15224E-12	0.00000	.16130E-11	0.00000	.23572E-12	0.00000	.51989E-01	0.00000
.11156E+00	0.00000	.90233E-12	0.00000	-.27952E-12	0.00000	-.10248E-11	0.00000	-.37485E-12	0.00000	-.46142E-01	0.00000
.11156E+00	0.00000	-.89110E-12	0.00000	-.29997E-12	0.00000	-.10015E-11	0.00000	-.20055E-12	0.00000	-.46142E-01	0.00000
.47914E-01	0.00000	-.58684E-12	0.00000	.39714E-12	0.00000	.74467E-12	0.00000	-.25147E-12	0.00000	-.41821E+00	0.00000
.47914E-01	0.00000	.49418E-12	0.00000	.41326E-12	0.00000	.79324E-12	0.00000	-.18585E-12	0.00000	-.41821E+00	0.00000
.10997E+00	0.00000	-.60614E-12	0.00000	-.35020E-12	0.00000	.43172E-12	0.00000	.58927E-12	0.00000	.18344E+00	0.00000
.10997E+00	0.00000	.56017E-12	0.00000	-.26846E-12	0.00000	.42194E-12	0.00000	.55309E-12	0.00000	.18344E+00	0.00000
.47127E-01	0.00000	.63516E-12	0.00000	-.13302E-12	0.00000	-.43422E-12	0.00000	-.43189E-12	0.00000	.11315E+00	0.00000
.47127E-01	0.00000	-.51119E-12	0.00000	-.16447E-12	0.00000	-.50826E-12	0.00000	-.40487E-12	0.00000	.11315E+00	0.00000
.47127E-01	0.00000	.50022E-12	0.00000	.15255E-12	0.00000	-.44854E-12	0.00000	-.21612E-12	0.00000	.11315E+00	0.00000
.47127E-01	0.00000	-.50272E-12	0.00000	.18427E-12	0.00000	-.32705E-12	0.00000	-.37888E-12	0.00000	.11315E+00	0.00000
.10997E+00	0.00000	-.68978E-12	0.00000	.24135E-12	0.00000	.52997E-12	0.00000	.45446E-12	0.00000	.18344E+00	0.00000
.10997E+00	0.00000	.60650E-12	0.00000	.29544E-12	0.00000	.39634E-12	0.00000	.82057E-12	0.00000	.18344E+00	0.00000
.47914E-01	0.00000	-.43554E-12	0.00000	-.38218E-12	0.00000	.60025E-12	0.00000	-.22441E-12	0.00000	-.41821E+00	0.00000
.47914E-01	0.00000	.44558E-12	0.00000	-.47431E-12	0.00000	.64763E-12	0.00000	-.52227E-12	0.00000	-.41821E+00	0.00000
.11156E+00	0.00000	.93733E-12	0.00000	.29937E-12	0.00000	-.10406E-11	0.00000	-.32834E-12	0.00000	-.46142E-01	0.00000
.11156E+00	0.00000	-.87441E-12	0.00000	.32492E-12	0.00000	-.97352E-12	0.00000	-.21460E-12	0.00000	-.46142E-01	0.00000
.20156E-01	0.00000	.13515E-12	0.00000	-.15422E-12	0.00000	.14722E-11	0.00000	.33847E-12	0.00000	.51989E-01	0.00000
.20156E-01	0.00000	-.17172E-12	0.00000	-.14055E-12	0.00000	.15477E-11	0.00000	.32176E-12	0.00000	.51989E-01	0.00000

NATURAL FREQUENCY= .140228E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.10772E-12	0.00000	.40077E-01	0.00000	.27796E-01	0.00000	.30640E+00	0.00000	-.15039E-12	0.00000	-.19668E-12	0.00000
.30874E-13	0.00000	-.40077E-01	0.00000	.27796E-01	0.00000	.30640E+00	0.00000	-.94878E-13	0.00000	.48688E-13	0.00000
.19910E-12	0.00000	.17855E+00	0.00000	-.58107E-01	0.00000	-.20233E+00	0.00000	-.22034E-13	0.00000	.19769E-12	0.00000
.13833E-12	0.00000	-.17855E+00	0.00000	-.58107E-01	0.00000	-.20233E+00	0.00000	.14445E-12	0.00000	-.36237E-13	0.00000
.23248E-13	0.00000	-.10196E+00	0.00000	.85435E-01	0.00000	.13870E+00	0.00000	.35562E-12	0.00000	.56214E-12	0.00000
.81923E-13	0.00000	.10196E+00	0.00000	.85435E-01	0.00000	.13870E+00	0.00000	-.54822E-13	0.00000	.78019E-12	0.00000
.16457E-12	0.00000	-.12790E+00	0.00000	-.58437E-01	0.00000	.94170E-01	0.00000	-.30730E-12	0.00000	-.11764E-12	0.00000
.78995E-13	0.00000	.12790E+00	0.00000	-.58437E-01	0.00000	.94170E-01	0.00000	.69604E-13	0.00000	-.24405E-13	0.00000
.58383E-13	0.00000	.11273E+00	0.00000	-.33202E-01	0.00000	-.91585E-01	0.00000	.10185E-12	0.00000	.50193E-13	0.00000
.36042E-13	0.00000	-.11273E+00	0.00000	-.33202E-01	0.00000	-.91585E-01	-0.00000	-.10138E-12	0.00000	-.10566E-12	0.00000
.96446E-13	0.00000	.11273E+00	0.00000	.33202E-01	0.00000	-.91585E-01	0.00000	-.69947E-13	0.00000	-.19415E-12	0.00000
.75680E-13	0.00000	-.11273E+00	0.00000	.33202E-01	0.00000	-.91585E-01	0.00000	.98478E-13	0.00000	-.20323E-13	0.00000
.13728E-12	0.00000	-.12790E+00	0.00000	.58437E-01	0.00000	.94170E-01	0.00000	-.19562E-13	0.00000	-.19752E-12	0.00000
.18309E-12	0.00000	.12790E+00	0.00000	.58437E-01	0.00000	.94170E-01	0.00000	-.23082E-12	0.00000	-.31011E-12	0.00000
.11015E-12	0.00000	-.10196E+00	0.00000	-.85435E-01	0.00000	.13870E+00	0.00000	.30956E-14	0.00000	.76616E-12	0.00000
.38339E-13	0.00000	.10196E+00	0.00000	-.85435E-01	0.00000	.13870E+00	0.00000	.24877E-12	0.00000	.55053E-12	0.00000
.13589E-12	0.00000	.17855E+00	0.00000	.58107E-01	0.00000	-.20233E+00	0.00000	.16148E-12	0.00000	-.34786E-13	0.00000
.23505E-12	0.00000	-.17855E+00	0.00000	.58107E-01	0.00000	-.20233E+00	0.00000	-.23278E-13	0.00000	.20623E-12	0.00000
.50875E-13	0.00000	.40077E-01	0.00000	-.27796E-01	0.00000	.30640E+00	0.00000	-.14332E-12	0.00000	.31102E-13	0.00000
.91740E-13	0.00000	-.40077E-01	0.00000	-.27796E-01	0.00000	.30640E+00	0.00000	-.69577E-13	0.00000	-.17449E-12	0.00000

NATURAL FREQUENCY= .140988E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.67769E-01	0.00000	-.40579E-13	0.00000	.34134E-13	0.00000	.11651E-12	0.00000	-.13223E-10	0.00000	-.31183E-01	0.00000
.67769E-01	0.00000	-.20914E-13	0.00000	-.30146E-13	0.00000	.74115E-13	0.00000	-.13244E-10	0.00000	-.31183E-01	0.00000
.16291E-01	0.00000	.65007E-13	0.00000	-.54685E-14	0.00000	-.78837E-13	0.00000	.13527E-10	0.00000	-.35297E+00	0.00000
.16291E-01	0.00000	-.89936E-14	0.00000	-.34214E-13	0.00000	-.23511E-13	0.00000	.13574E-10	0.00000	-.35297E+00	0.00000
.13920E+00	0.00000	.51034E-13	0.00000	-.36594E-13	0.00000	-.93681E-13	0.00000	.12005E-10	0.00000	.12022E+00	0.00000
.13920E+00	0.00000	.86731E-14	0.00000	.63693E-13	0.00000	-.25696E-13	0.00000	.12062E-10	0.00000	.12022E+00	0.00000
.53942E-01	0.00000	-.53424E-13	0.00000	.46553E-13	0.00000	.10761E-12	0.00000	-.26287E-10	0.00000	.29271E+00	0.00000
.53942E-01	0.00000	.59678E-13	0.00000	-.26695E-13	0.00000	.37585E-13	0.00000	-.26120E-10	0.00000	.29271E+00	0.00000
.33781E-01	0.00000	.31068E-13	0.00000	.29132E-13	0.00000	-.14759E-12	0.00000	.14053E-10	0.00000	-.39157E-01	0.00000
.33781E-01	0.00000	-.37835E-13	0.00000	-.49752E-13	0.00000	.23116E-13	0.00000	.13840E-10	0.00000	-.39157E-01	0.00000
.33781E-01	0.00000	.17399E-13	0.00000	-.27841E-13	0.00000	-.68384E-14	0.00000	.13468E-10	0.00000	.39157E-01	0.00000
.33781E-01	0.00000	-.18595E-13	0.00000	.51747E-13	0.00000	.16511E-13	0.00000	.13759E-10	0.00000	.39157E-01	0.00000
.53942E-01	0.00000	-.64517E-13	0.00000	.44524E-13	0.00000	.93797E-13	0.00000	-.26023E-10	0.00000	-.29271E+00	0.00000
.53942E-01	0.00000	.14007E-13	0.00000	-.29480E-13	0.00000	.11862E-13	0.00000	-.26258E-10	0.00000	-.29271E+00	0.00000
.13920E+00	0.00000	.16713E-13	0.00000	.46838E-14	0.00000	-.81095E-13	0.00000	.12246E-10	0.00000	-.12022E+00	0.00000
.13920E+00	0.00000	.12924E-13	0.00000	-.31437E-13	0.00000	.30416E-13	0.00000	.12412E-10	0.00000	-.12022E+00	0.00000
.16291E-01	0.00000	.61412E-13	0.00000	-.35174E-13	0.00000	.35004E-13	0.00000	.13516E-10	0.00000	.35297E+00	0.00000
.16291E-01	0.00000	.81957E-15	0.00000	.64687E-13	0.00000	-.83646E-13	0.00000	.13348E-10	0.00000	.35297E+00	0.00000
.67769E-01	0.00000	-.20465E-13	0.00000	.32732E-13	0.00000	-.96552E-14	0.00000	-.13357E-10	0.00000	.31183E-01	0.00000
.67769E-01	0.00000	-.30477E-13	0.00000	-.49122E-13	0.00000	.11369E-12	0.00000	-.13199E-10	0.00000	.31183E-01	0.00000

NATURAL FREQUENCY= .141188E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.80298E-01	0.00000	.73672E-13	0.00000	.90672E-13	0.00000	.40022E-12	0.00000	.12803E+00	0.00000	.12769E+00	0.00000
.80298E-01	0.00000	-.46307E-13	0.00000	-.18922E-13	0.00000	.36345E-12	0.00000	.12803E+00	0.00000	-.12769E+00	0.00000
.79085E-01	0.00000	.23112E-12	0.00000	-.98556E-13	0.00000	-.26433E-12	0.00000	-.13043E+00	0.00000	-.14739E+00	0.00000
.79085E-01	0.00000	-.15184E-12	0.00000	-.12326E-13	0.00000	-.15005E-12	0.00000	-.13043E+00	0.00000	.14739E+00	0.00000
.33191E-01	0.00000	-.15190E-12	0.00000	.47855E-13	0.00000	.24955E-12	0.00000	-.11755E+00	0.00000	.20406E+00	0.00000
.33191E-01	0.00000	.86630E-13	0.00000	.83785E-13	0.00000	.14493E-12	0.00000	-.11755E+00	0.00000	-.20406E+00	0.00000
.75438E-01	0.00000	-.12350E-12	0.00000	-.15813E-13	0.00000	.77427E-13	0.00000	.25255E+00	0.00000	-.13136E-01	0.00000
.75438E-01	0.00000	.75985E-13	0.00000	-.74292E-13	0.00000	.44100E-13	0.00000	.25255E+00	0.00000	.13136E-01	0.00000
.43459E-01	0.00000	.14829E-12	0.00000	-.36095E-13	0.00000	-.10631E-12	0.00000	-.13260E+00	0.00000	-.15678E+00	0.00000
.43459E-01	0.00000	-.85926E-13	0.00000	-.42715E-13	0.00000	-.78527E-13	0.00000	-.13260E+00	0.00000	.15678E+00	0.00000
.43459E-01	0.00000	.15956E-12	0.00000	.65908E-14	0.00000	-.11208E-12	0.00000	-.13260E+00	0.00000	.15678E+00	0.00000
.43459E-01	0.00000	-.92721E-13	0.00000	.33494E-13	0.00000	-.11832E-12	0.00000	-.13260E+00	0.00000	-.15678E+00	0.00000
.75438E-01	0.00000	-.13751E-12	0.00000	.77483E-13	0.00000	.11294E-12	0.00000	.25255E+00	0.00000	.13136E-01	0.00000
.75438E-01	0.00000	.43295E-13	0.00000	.33812E-13	0.00000	.60653E-13	0.00000	.25255E+00	0.00000	-.13136E-01	0.00000
.33191E-01	0.00000	-.10633E-12	0.00000	-.64497E-13	0.00000	.12195E-12	0.00000	-.11755E+00	0.00000	-.20406E+00	0.00000
.33191E-01	0.00000	.10143E-12	0.00000	-.49886E-13	0.00000	.18320E-12	0.00000	-.11755E+00	0.00000	.20406E+00	0.00000
.79085E-01	0.00000	.18576E-12	0.00000	-.99300E-14	0.00000	-.13223E-12	0.00000	-.13043E+00	0.00000	.14739E+00	0.00000
-.79085E-01	0.00000	-.12146E-12	0.00000	.78851E-13	0.00000	-.22351E-12	0.00000	-.13043E+00	0.00000	-.14739E+00	0.00000
-.80298E-01	0.00000	.24706E-13	0.00000	.36009E-13	0.00000	.24042E-12	0.00000	.12803E+00	0.00000	-.12769E+00	0.00000
.80298E-01	0.00000	-.62198E-13	0.00000	-.56028E-13	0.00000	.26320E-12	0.00000	.12803E+00	0.00000	.12769E+00	0.00000

NATURAL FREQUENCY= .141740E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.26720E-13	0.00000	.32785E-13	0.00000	-.31287E-13	0.00000	.86943E-13	0.00000	-.49469E-01	0.00000	.76180E-13	0.00000
.98900E-13	0.00000	-.70363E-14	0.00000	.58475E-13	0.00000	.21097E-12	0.00000	.49469E-01	0.00000	-.15830E-12	0.00000
.91871E-15	0.00000	.90955E-13	0.00000	-.28261E-13	0.00000	-.40427E-13	0.00000	.14356E+00	0.00000	-.22277E-12	0.00000
-.14850E-12	0.00000	-.11286E-12	0.00000	-.51514E-13	0.00000	-.19726E-12	0.00000	-.14356E+00	0.00000	.35233E-13	0.00000
-.25176E-13	0.00000	-.51028E-13	0.00000	.97957E-13	0.00000	.75327E-14	0.00000	-.22361E+00	0.00000	.51280E-12	0.00000
-.78175E-13	0.00000	.29007E-13	0.00000	.17265E-13	0.00000	.11280E-12	0.00000	.22361E+00	0.00000	.19290E-12	0.00000
.46231E-13	0.00000	-.75507E-13	0.00000	-.10842E-12	0.00000	.46137E-13	0.00000	.28176E+00	0.00000	.14963E-12	0.00000
.15514E-12	0.00000	.71239E-13	0.00000	.23154E-13	0.00000	.69832E-13	0.00000	-.28176E+00	0.00000	.14089E-12	0.00000
.14076E-14	0.00000	.44094E-13	0.00000	.15670E-13	0.00000	.51098E-13	0.00000	-.31233E+00	0.00000	-.17495E-12	0.00000
-.40501E-13	0.00000	-.37105E-13	0.00000	-.54860E-13	0.00000	-.13577E-12	0.00000	-.31233E+00	0.00000	.11179E-12	0.00000
.98070E-13	0.00000	.28420E-13	0.00000	.42966E-13	0.00000	-.10974E-12	0.00000	.31233E+00	0.00000	.23286E-12	0.00000
.42177E-14	0.00000	-.88589E-13	0.00000	-.51728E-13	0.00000	.12675E-14	0.00000	-.31233E+00	0.00000	.63349E-14	0.00000
.10195E-13	0.00000	-.60973E-13	0.00000	-.54274E-14	0.00000	.49665E-13	0.00000	-.28176E+00	0.00000	-.28839E-12	0.00000
.12794E-12	0.00000	.36435E-13	0.00000	.47902E-13	0.00000	.59195E-13	0.00000	.28176E+00	0.00000	-.33375E-12	0.00000
-.80055E-13	0.00000	-.28324E-13	0.00000	-.29641E-14	0.00000	.73690E-13	0.00000	.22361E+00	0.00000	-.37076E-12	0.00000
-.12255E-12	0.00000	.57522E-13	0.00000	-.69562E-13	0.00000	.43380E-13	0.00000	-.22361E+00	0.00000	-.26933E-13	0.00000
.19687E-13	0.00000	.85689E-13	0.00000	.92234E-14	0.00000	-.11147E-12	0.00000	-.14356E+00	0.00000	.20205E-12	0.00000
-.10118E-12	0.00000	-.68660E-13	0.00000	.81687E-13	0.00000	-.36532E-13	0.00000	.14356E+00	0.00000	-.32219E-13	0.00000
-.41545E-13	0.00000	.13449E-13	0.00000	-.40784E-13	0.00000	.28956E-12	0.00000	.49469E-01	0.00000	-.77977E-13	0.00000
.73171E-13	0.00000	-.19247E-13	0.00000	-.70761E-14	0.00000	.29764E-13	0.00000	-.49469E-01	0.00000	.11532E-12	0.00000

ORIGINAL PAGE IS
OF POOR QUALITY

NATURAL FREQUENCY= .143130E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.15267E-01	0.00000	-.33070E-13	0.00000	.38511E-13	0.00000	.16820E-12	0.00000	.24996E-12	0.00000	-.30563E-01	0.00000
.15267E-01	0.00000	-.50486E-13	0.00000	-.16922E-13	0.00000	-.36046E-13	0.00000	.18443E-12	0.00000	-.30563E-01	0.00000
-.68375E-01	0.00000	.40364E-13	0.00000	-.73502E-13	0.00000	-.63016E-13	0.00000	-.32100E-12	0.00000	.54958E-02	0.00000
-.68375E-01	0.00000	.29675E-13	0.00000	.62686E-13	0.00000	.18831E-13	0.00000	-.22652E-12	0.00000	.54958E-02	0.00000
.21470E-01	0.00000	-.21358E-14	0.00000	-.47832E-13	0.00000	.42659E-13	0.00000	-.28590E-12	0.00000	.28281E+00	0.00000
.21470E-01	0.00000	.57829E-13	0.00000	.42624E-13	0.00000	-.90942E-13	0.00000	-.34529E-12	0.00000	.28281E+00	0.00000
.13650E+00	0.00000	-.51584E-13	0.00000	-.77696E-14	0.00000	.11830E-13	0.00000	.61792E-12	0.00000	-.17257E+00	0.00000
.13650E+00	0.00000	-.21225E-13	0.00000	.29482E-14	0.00000	.18689E-13	0.00000	.60683E-12	0.00000	-.17257E+00	0.00000
-.10486E+00	0.00000	.42948E-13	0.00000	.18000E-13	0.00000	-.15408E-12	0.00000	-.15562E-12	0.00000	-.33274E+00	0.00000
-.10486E+00	0.00000	-.22306E-13	0.00000	.39580E-13	0.00000	.23849E-13	0.00000	-.29643E-12	0.00000	-.33274E+00	0.00000
-.10486E+00	0.00000	-.34667E-13	0.00000	.78240E-14	0.00000	.83593E-13	0.00000	-.44517E-12	0.00000	.33274E+00	0.00000
-.10486E+00	0.00000	.93289E-13	0.00000	.68050E-13	0.00000	-.57909E-13	0.00000	-.42016E-12	0.00000	.33274E+00	0.00000
.13650E+00	0.00000	-.11411E-12	0.00000	.12293E-13	0.00000	.13216E-12	0.00000	.71613E-12	0.00000	.17257E+00	0.00000
.13650E+00	0.00000	.14575E-13	0.00000	-.13815E-12	0.00000	.95875E-13	0.00000	.69658E-12	0.00000	.17257E+00	0.00000
.21470E-01	0.00000	.12720E-12	0.00000	-.60754E-13	0.00000	-.24804E-12	0.00000	-.26128E-12	0.00000	-.28281E+00	0.00000
.21470E-01	0.00000	-.10871E-12	0.00000	.66812E-13	0.00000	-.86141E-13	0.00000	-.24219E-12	0.00000	-.28281E+00	0.00000
-.68375E-01	0.00000	.19734E-13	0.00000	-.55625E-13	0.00000	.21406E-12	0.00000	-.35348E-12	0.00000	-.54958E-02	0.00000
-.68375E-01	0.00000	.10278E-12	0.00000	.62127E-13	0.00000	-.54845E-13	0.00000	-.37263E-12	0.00000	-.54958E-02	0.00000
.15267E-01	0.00000	-.12176E-12	0.00000	.81167E-13	0.00000	-.22263E-12	0.00000	.43036E-12	0.00000	.30563E-01	0.00000
.15267E-01	0.00000	.47978E-13	0.00000	-.54418E-13	0.00000	-.62262E-13	0.00000	.47523E-12	0.00000	.30563E-01	0.00000

NATURAL FREQUENCY= .143337E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.36973E-01	0.00000	.24533E-13	0.00000	-.96226E-13	0.00000	-.18913E-12	0.00000	.98276E-13	0.00000	-.15501E-01	0.00000
.36973E-01	0.00000	.11057E-12	0.00000	.29950E-13	0.00000	.70128E-13	0.00000	.91605E-13	0.00000	-.15501E-01	0.00000
.74590E-02	0.00000	-.13464E-12	0.00000	.76278E-13	0.00000	.32759E-13	0.00000	-.59278E-13	0.00000	-.20409E+00	0.00000
.74590E-02	0.00000	-.60895E-13	0.00000	-.58349E-13	0.00000	-.22388E-13	0.00000	-.50359E-13	0.00000	-.20409E+00	0.00000
.11399E+00	0.00000	-.19177E-13	0.00000	-.10629E-13	0.00000	.50540E-13	0.00000	-.53760E-12	0.00000	.99866E-01	0.00000
.11399E+00	0.00000	.93300E-15	0.00000	-.79278E-13	0.00000	.78764E-13	0.00000	-.39494E-12	0.00000	.99866E-01	0.00000
.67792E-01	0.00000	.16743E-12	0.00000	-.28571E-13	0.00000	-.89583E-13	0.00000	.51512E-12	0.00000	.32161E+00	0.00000
.67792E-01	0.00000	-.28802E-13	0.00000	.29533E-13	0.00000	-.15336E-12	0.00000	.48765E-12	0.00000	.32161E+00	0.00000
.12368E+00	0.00000	-.11301E-12	0.00000	.22367E-13	0.00000	.15613E-12	0.00000	.91917E-13	0.00000	-.25834E+00	0.00000
.12368E+00	0.00000	-.12025E-13	0.00000	.36585E-13	0.00000	.31921E-13	0.00000	-.56540E-14	0.00000	-.25834E+00	0.00000
.12368E+00	0.00000	-.65338E-13	0.00000	.16704E-13	0.00000	-.36423E-13	0.00000	-.81657E-12	0.00000	-.25834E+00	0.00000
.12368E+00	0.00000	-.70211E-14	0.00000	-.93360E-13	0.00000	.24509E-14	0.00000	-.77630E-12	0.00000	-.25834E+00	0.00000
.67792E-01	0.00000	.18312E-12	0.00000	-.59788E-13	0.00000	-.19624E-12	0.00000	.83180E-12	0.00000	.32161E+00	0.00000
.67792E-01	0.00000	.25350E-13	0.00000	.10861E-12	0.00000	-.47368E-13	0.00000	.87610E-12	0.00000	.32161E+00	0.00000
.11399E+00	0.00000	-.76897E-13	0.00000	.73736E-13	0.00000	.25740E-12	0.00000	-.66789E-13	0.00000	.99866E-01	0.00000
.11399E+00	0.00000	.15501E-13	0.00000	-.10012E-13	0.00000	-.55672E-13	0.00000	-.12518E-12	0.00000	.99866E-01	0.00000
.74590E-02	0.00000	-.10916E-12	0.00000	.31071E-13	0.00000	-.98874E-13	0.00000	-.69952E-12	0.00000	-.20409E+00	0.00000
.74590E-02	0.00000	-.63213E-13	0.00000	-.68183E-13	0.00000	.16132E-12	0.00000	-.76638E-12	0.00000	-.20409E+00	0.00000
-.36973E-01	0.00000	.10160E-12	0.00000	-.66270E-13	0.00000	.26533E-12	0.00000	.50272E-12	0.00000	-.15501E-01	0.00000
-.36973E-01	0.00000	.20954E-13	0.00000	.42697E-13	0.00000	-.15952E-12	0.00000	.57605E-12	0.00000	-.15501E-01	0.00000

NATURAL FREQUENCY= .14411DE+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.76777E-13	0.00000	-.44315E-13	0.00000	-.11253E+00	0.00000	-.19881E+00	0.00000	.36786E-13	0.00000	-.59057E-13	0.00000
.77929E-13	0.00000	.60325E-13	0.00000	.11253E+00	0.00000	.19891E+00	0.00000	-.20701E-14	0.00000	-.55490E-13	0.00000
-.90207E-13	0.00000	-.14548E-13	0.00000	.41826E-01	0.00000	.22194E+00	0.00000	-.59723E-13	0.00000	-.28955E-12	0.00000
-.11665E-12	0.00000	-.65838E-15	0.00000	-.41826E-01	0.00000	-.22194E+00	0.00000	-.27891E-13	0.00000	-.20712E-12	0.00000
-.64956E-13	0.00000	.71387E-13	0.00000	.16215E+00	0.00000	-.18406E+00	0.00000	-.85683E-13	0.00000	.47910E-12	0.00000
-.10181E-12	0.00000	-.84052E-13	0.00000	-.16215E+00	0.00000	.18406E+00	0.00000	.13005E-13	0.00000	.45960E-12	0.00000
.22631E-12	0.00000	-.43806E-13	0.00000	-.18465E+00	0.00000	-.56097E-01	0.00000	.99372E-13	0.00000	.66423E-13	0.00000
.23049E-12	0.00000	.41723E-13	0.00000	.18465E+00	0.00000	.56097E-01	0.00000	-.75214E-14	0.00000	.47740E-13	0.00000
-.56967E-13	0.00000	-.55651E-13	0.00000	.93205E-01	0.00000	.22527E+00	0.00000	-.56435E-15	0.00000	-.53797E-12	0.00000
-.72824E-13	0.00000	-.60467E-14	0.00000	-.93205E-01	0.00000	-.22527E+00	0.00000	-.18107E-13	0.00000	-.40221E-12	0.00000
-.10016E-12	0.00000	.66103E-13	0.00000	.93205E-01	0.00000	-.22527E+00	0.00000	-.19419E-12	0.00000	.28439E-12	0.00000
-.16451E-12	0.00000	-.70655E-13	0.00000	-.93205E-01	0.00000	.22527E+00	0.00000	.21466E-13	0.00000	.30029E-12	0.00000
.15697E-12	0.00000	.32168E-13	0.00000	-.18465E+00	0.00000	.56097E-01	0.00000	.18859E-12	0.00000	.16704E-12	0.00000
.17374E-12	0.00000	.62261E-13	0.00000	.18465E+00	0.00000	-.56097E-01	0.00000	-.65678E-13	0.00000	.13185E-12	0.00000
-.76186E-14	0.00000	-.10510E-12	0.00000	.16215E+00	0.00000	.18406E+00	0.00000	-.42610E-13	0.00000	-.51509E-12	0.00000
.21055E-14	0.00000	.65857E-13	0.00000	-.16215E+00	0.00000	-.18406E+00	0.00000	.13672E-12	0.00000	-.27418E-12	0.00000
-.65236E-13	0.00000	.40129E-13	0.00000	.41826E-01	0.00000	-.22194E+00	0.00000	-.13272E-13	0.00000	.91139E-13	0.00000
-.11272E-12	0.00000	-.11454E-12	0.00000	-.41826E-01	0.00000	.22194E+00	0.00000	-.12332E-12	0.00000	.66974E-13	0.00000
-.81936E-14	0.00000	.11245E-12	0.00000	-.11253E+00	0.00000	.17881E+00	0.00000	.33022E-13	0.00000	.11721E-13	0.00000
.44289E-13	0.00000	-.22257E-13	0.00000	.11253E+00	0.00000	-.19881E+00	0.00000	.82414E-13	0.00000	.93592E-13	0.00000

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.67235E-01	0.00000	.12667E-13	0.00000	.94200E-13	0.00000	.12207E-12	0.00000	-.11119E+00	0.00000	-.94709E-01	0.00000
-.67235E-01	0.00000	-.13467E-12	0.00000	-.65618E-13	0.00000	-.46723E-13	0.00000	-.11119E+00	0.00000	.94709E-01	0.00000
-.82402E-01	0.00000	-.64673E-14	0.00000	-.57877E-13	0.00000	.74729E-13	0.00000	.17511E+00	0.00000	.10197E+00	0.00000
.82402E-01	0.00000	.57604E-13	0.00000	.60166E-13	0.00000	.17410E-12	0.00000	.17511E+00	0.00000	-.10197E+00	0.00000
.21463E-01	0.00000	.28372E-13	0.00000	-.69419E-14	0.00000	.37805E-13	0.00000	-.58977E-01	0.00000	-.25140E+00	0.00000
-.21463E-01	0.00000	.28245E-14	0.00000	.11042E-13	0.00000	-.79945E-13	0.00000	-.58977E-01	0.00000	.25140E+00	0.00000
.25679E-01	0.00000	-.64169E-14	0.00000	.53891E-13	0.00000	-.24093E-13	0.00000	-.99195E-01	0.00000	.20313E+00	0.00000
-.25679E-01	0.00000	.85641E-14	0.00000	-.22101E-13	0.00000	.10070E-12	0.00000	-.99195E-01	0.00000	-.20313E+00	0.00000
-.66741E-01	0.00000	.43017E-15	0.00000	-.74934E-13	0.00000	.43552E-13	0.00000	.21750E+00	0.00000	-.95687E-01	0.00000
.66741E-01	0.00000	-.15062E-13	0.00000	.37994E-13	0.00000	-.53300E-14	0.00000	.21750E+00	0.00000	.95687E-01	0.00000
.66741E-01	0.00000	-.21140E-13	0.00000	.72703E-13	0.00000	.43104E-13	0.00000	-.21750E+00	0.00000	-.95687E-01	0.00000
-.66741E-01	0.00000	-.55337E-14	0.00000	-.11516E-13	0.00000	.52278E-13	0.00000	-.21750E+00	0.00000	.95687E-01	0.00000
-.25679E-01	0.00000	-.18461E-13	0.00000	-.26064E-13	0.00000	-.18049E-15	0.00000	.99195E-01	0.00000	.20313E+00	0.00000
.25679E-01	0.00000	-.28942E-14	0.00000	.62705E-14	0.00000	.10010E-12	0.00000	.99195E-01	0.00000	-.20313E+00	0.00000
-.21463E-01	0.00000	.58251E-13	0.00000	.12786E-13	0.00000	.44323E-13	0.00000	.58977E-01	0.00000	-.25140E+00	0.00000
.21463E-01	0.00000	-.21410E-13	0.00000	-.16278E-13	0.00000	-.11645E-12	0.00000	.58977E-01	0.00000	.25140E+00	0.00000
.82402E-01	0.00000	-.11321E-13	0.00000	-.98935E-14	0.00000	.65533E-14	0.00000	-.17511E+00	0.00000	.10197E+00	0.00000
-.82402E-01	0.00000	-.46829E-14	0.00000	-.52537E-14	0.00000	.11558E-12	0.00000	-.17511E+00	0.00000	-.10197E+00	0.00000
-.67235E-01	0.00000	.30356E-14	0.00000	-.10982E-13	0.00000	.15860E-13	0.00000	.11119E+00	0.00000	-.94709E-01	0.00000
.67235E-01	0.00000	-.31612E-14	0.00000	.20173E-15	0.00000	-.18679E-13	0.00000	.11119E+00	0.00000	.94709E-01	0.00000

NATURAL FREQUENCY= .146627E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.14632E-13	0.00000	.10875E+00	0.00000	.17045E-01	0.00000	.24343E+00	0.00000	-.32610E-13	0.00000	.24933E-13	0.00000
.14240E-13	0.00000	-.10875E+00	0.00000	.17045E-01	0.00000	.24343E+00	0.00000	.23054E-13	0.00000	-.24944E-13	0.00000
.15453E-13	0.00000	.72965E-01	0.00000	-.11665E-02	0.00000	-.13427E+00	0.00000	.35108E-13	0.00000	.29340E-13	0.00000
.72996E-14	0.00000	-.72965E-01	0.00000	-.11665E-02	0.00000	-.13427E+00	0.00000	-.18517E-13	0.00000	.54648E-13	0.00000
.55319E-14	0.00000	-.18351E+00	0.00000	.19430E-01	0.00000	.27352E+00	0.00000	.66255E-13	0.00000	-.15653E-13	0.00000
.32769E-13	0.00000	.18351E+00	0.00000	.19430E-01	0.00000	.27352E+00	0.00000	-.10453E-13	0.00000	.25453E-13	0.00000
.25303E-13	0.00000	.72065E-01	0.00000	-.82792E-01	0.00000	-.11189E+00	0.00000	-.97169E-13	0.00000	-.83274E-13	0.00000
-.54477E-13	0.00000	-.72665E-01	0.00000	-.82792E-01	0.00000	-.11189E+00	0.00000	-.49201E-13	0.00000	-.24687E-13	0.00000
.71243E-14	0.00000	.12348E+00	0.00000	.47484E-01	0.00000	-.11266E+00	0.00000	-.14281E-13	0.00000	.82389E-13	0.00000
.24421E-14	0.00000	-.12348E+00	0.00000	.47484E-01	0.00000	-.11266E+00	0.00000	-.64989E-14	0.00000	-.10646E-12	0.00000
.74321E-14	0.00000	-.12348E+00	0.00000	.47484E-01	0.00000	.11266E+00	0.00000	.31278E-13	0.00000	-.17977E-12	0.00000
.14423E-13	0.00000	.12348E+00	0.00000	.47484E-01	0.00000	.11266E+00	0.00000	.22387E-13	0.00000	-.59980E-13	0.00000
-.60176E-13	0.00000	-.72665E-01	0.00000	-.82792E-01	0.00000	.11189E+00	0.00000	-.53800E-13	0.00000	-.11073E-13	0.00000
-.83587E-13	0.00000	.72665E-01	0.00000	-.82792E-01	0.00000	.11189E+00	0.00000	-.76696E-13	0.00000	-.42607E-13	0.00000
.15107E-14	0.00000	.18351E+00	0.00000	.19430E-01	0.00000	-.27352E+00	0.00000	.80812E-13	0.00000	.22521E-12	0.00000
.33796E-13	0.00000	-.18351E+00	0.00000	.19430E-01	0.00000	-.27352E+00	0.00000	.33856E-13	0.00000	.15234E-12	0.00000
.30021E-13	0.00000	-.72965E-01	0.00000	-.11665E-02	0.00000	.13427E+00	0.00000	-.96725E-14	0.00000	-.19619E-12	0.00000
.52208E-13	0.00000	.72965E-01	0.00000	-.11665E-02	0.00000	.13427E+00	0.00000	.85602E-14	0.00000	-.65631E-13	0.00000
.53404E-14	0.00000	-.10875E+00	0.00000	.17045E-01	0.00000	-.24343E+00	0.00000	-.56408E-13	0.00000	.29170E-13	0.00000
-.79327E-13	0.00000	.10875E+00	0.00000	.17045E-01	0.00000	-.24343E+00	0.00000	-.19252E-13	0.00000	-.73259E-13	0.00000

NATURAL FREQUENCY= .150333E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.50273E-01	0.00000	-.16365E-12	0.00000	-.16348E-13	0.00000	-.37741E-13	0.00000	-.77216E-01	0.00000	-.61399E-01	0.00000
-.50273E-01	0.00000	-.57630E-13	0.00000	-.42470E-13	0.00000	-.11924E-12	0.00000	-.77216E-01	0.00000	.61399E-01	0.00000
-.64602E-01	0.00000	.23723E-12	0.00000	.39434E-14	0.00000	-.11422E-12	0.00000	.14377E+00	0.00000	.36350E-01	0.00000
.64602E-01	0.00000	.12302E-12	0.00000	.44872E-13	0.00000	-.22039E-13	0.00000	.14377E+00	0.00000	-.36350E-01	0.00000
.43237E-01	0.00000	.12941E-14	0.00000	.10713E-13	0.00000	.45589E-13	0.00000	-.13251E+00	0.00000	-.19340E+00	0.00000
-.43237E-01	0.00000	.21999E-13	0.00000	.25676E-13	0.00000	-.60145E-14	0.00000	-.13251E+00	0.00000	.19340E+00	0.00000
-.36589E-01	0.00000	-.25004E-12	0.00000	.63372E-13	0.00000	.32719E-13	0.00000	.97757E-01	0.00000	.23587E+00	0.00000
.36589E-01	0.00000	-.17158E-12	0.00000	-.23346E-13	0.00000	.10184E-12	0.00000	.97757E-01	0.00000	-.23587E+00	0.00000
.76800E-02	0.00000	.18266E-12	0.00000	-.11207E-12	0.00000	-.27654E-13	0.00000	-.31804E-01	0.00000	-.29878E+00	0.00000
-.76800E-02	0.00000	.12028E-12	0.00000	.13127E-13	0.00000	-.85494E-14	0.00000	-.31804E-01	0.00000	.29878E+00	0.00000
.76800E-02	0.00000	.12517E-12	0.00000	.11768E-12	0.00000	.10584E-12	0.00000	-.31804E-01	0.00000	.29878E+00	0.00000
-.76800E-02	0.00000	.12292E-12	0.00000	.35446E-14	0.00000	.13950E-14	0.00000	-.31804E-01	0.00000	-.29878E+00	0.00000
-.36589E-01	0.00000	-.25139E-12	0.00000	-.87899E-13	0.00000	-.52394E-13	0.00000	.97757E-01	0.00000	-.23587E+00	0.00000
.36589E-01	0.00000	-.18623E-12	0.00000	-.27765E-13	0.00000	.16527E-12	0.00000	.97757E-01	0.00000	.23587E+00	0.00000
.43237E-01	0.00000	.80015E-14	0.00000	.14522E-13	0.00000	.51568E-13	0.00000	-.13251E+00	0.00000	.19340E+00	0.00000
-.43237E-01	0.00000	-.71458E-13	0.00000	.14662E-13	0.00000	-.15422E-12	0.00000	-.13251E+00	0.00000	-.19340E+00	0.00000
-.64602E-01	0.00000	.22759E-12	0.00000	.74493E-13	0.00000	-.74029E-13	0.00000	.14377E+00	0.00000	-.36350E-01	0.00000
.64602E-01	0.00000	.21189E-12	0.00000	-.84338E-13	0.00000	.66102E-13	0.00000	.14377E+00	0.00000	.36350E-01	0.00000
.50273E-01	0.00000	-.11798E-12	0.00000	-.65745E-13	0.00000	.63248E-13	0.00000	-.77216E-01	0.00000	.61399E-01	0.00000
-.50273E-01	0.00000	-.11899E-12	0.00000	.75266E-13	0.00000	-.11318E-12	0.00000	-.77216E-01	0.00000	-.61399E-01	0.00000

NATURAL FREQUENCY= .150975E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.35725E-13	0.00000	.18587E+00	0.00000	-.28110E-11	0.00000	-.46220E-11	0.00000	-.12292E-13	0.00000	.69290E-13	0.00000
.50361E-14	0.00000	.18587E+00	0.00000	.27746E-11	0.00000	.40106E-11	0.00000	-.44569E-13	0.00000	-.73431E-13	0.00000
.57017E-13	0.00000	-.30075E+00	0.00000	.26216E-11	0.00000	.45073E-11	0.00000	-.12482E-13	0.00000	-.12508E-12	0.00000
-.25991E-13	0.00000	-.30075E+00	0.00000	-.27652E-11	0.00000	-.42495E-11	0.00000	.30335E-13	0.00000	-.61393E-13	0.00000
.28095E-13	0.00000	.19193E-12	0.00000	.59454E-12	0.00000	-.75443E-11	0.00000	-.70092E-13	0.00000	-.35791E-13	0.00000
-.29614E-13	0.00000	-.45380E-12	0.00000	-.38836E-12	0.00000	.60774E-11	0.00000	-.76962E-13	0.00000	-.81315E-13	0.00000
-.16232E-13	0.00000	.30075E+00	0.00000	-.22852E-11	0.00000	.54549E-11	0.00000	.92332E-13	0.00000	-.49565E-13	0.00000
.30055E-13	0.00000	.30075E+00	0.00000	.24524E-11	0.00000	-.38600E-11	0.00000	.94252E-13	0.00000	-.20279E-12	0.00000
-.58307E-13	0.00000	-.18587E+00	0.00000	.37163E-11	0.00000	-.26272E-11	0.00000	.11464E-13	0.00000	-.11873E-12	0.00000
-.68207E-13	0.00000	-.18587E+00	0.00000	-.41925E-11	0.00000	.17063E-11	0.00000	.33113E-13	0.00000	.11470E-12	0.00000
.25007E-13	0.00000	-.18587E+00	0.00000	-.37767E-11	0.00000	-.22874E-11	0.00000	-.57924E-13	0.00000	.16532E-12	0.00000
-.21705E-13	0.00000	-.18587E+00	0.00000	.41870E-11	0.00000	.17979E-11	0.00000	-.41757E-13	0.00000	.75129E-13	0.00000
.48353E-13	0.00000	.30075E+00	0.00000	.23862E-11	0.00000	.51016E-11	0.00000	.30764E-13	0.00000	-.52597E-13	0.00000
.33971E-13	0.00000	.30075E+00	0.00000	-.24912E-11	0.00000	-.39546E-11	0.00000	-.21130E-13	0.00000	.59192E-14	0.00000
-.21053E-13	0.00000	.29182E-12	0.00000	-.63553E-12	0.00000	-.72825E-11	0.00000	-.47125E-13	0.00000	-.45291E-13	0.00000
-.34107E-13	0.00000	-.15762E-12	0.00000	.45036E-12	0.00000	.62748E-11	0.00000	-.27586E-13	0.00000	-.11895E-12	0.00000
-.14409E-13	0.00000	-.30075E+00	0.00000	-.25671E-11	0.00000	.44874E-11	0.00000	.20385E-13	0.00000	.92727E-13	0.00000
-.36170E-13	0.00000	-.30075E+00	0.00000	.26975E-11	0.00000	-.42814E-11	0.00000	.56545E-13	0.00000	.26239E-13	0.00000
-.16774E-13	0.00000	.18587E+00	0.00000	.27812E-11	0.00000	-.44707E-11	0.00000	-.12410E-13	0.00000	.30109E-15	0.00000
.26533E-13	0.00000	.18587E+00	0.00000	-.27599E-11	0.00000	.40342E-11	0.00000	-.18152E-13	0.00000	.26658E-13	0.00000

NATURAL FREQUENCY= .151316E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.68577E-13	0.00000	.32185E-11	0.00000	.11712E+00	0.00000	.17968E+00	0.00000	.41348E-13	0.00000	.77714E-13	0.00000
.81243E-13	0.00000	.54191E-11	0.00000	-.11712E+00	0.00000	-.17968E+00	0.00000	.10863E-12	0.00000	-.94337E-13	0.00000
.34310E-13	0.00000	-.67719E-11	0.00000	-.11115E+00	0.00000	-.18471E+00	0.00000	-.51917E-13	0.00000	.15350E-13	0.00000
-.54622E-13	0.00000	-.70679E-11	0.00000	.11115E+00	0.00000	.18471E+00	0.00000	-.89012E-13	0.00000	-.50694E-13	0.00000
-.45737E-13	0.00000	.14314E-11	0.00000	-.21642E-01	0.00000	.28560E+00	0.00000	.15331E-12	0.00000	.25670E-12	0.00000
.54377E-13	0.00000	-.14094E-11	0.00000	.21642E-01	0.00000	-.28560E+00	0.00000	.81302E-13	0.00000	-.19217E-12	0.00000
.22536E-14	0.00000	.51310E-11	0.00000	.10043E+00	0.00000	-.19340E+00	0.00000	-.42400E-14	0.00000	-.14517E-12	0.00000
-.48897E-14	0.00000	.89807E-11	0.00000	-.10043E+00	0.00000	.19340E+00	0.00000	-.19085E-13	0.00000	.11864E-12	0.00000
.24079E-14	0.00000	-.37892E-11	0.00000	-.16594E+00	0.00000	.88575E-01	0.00000	-.91041E-13	0.00000	.29018E-12	0.00000
-.25311E-13	0.00000	-.48850E-11	0.00000	.16594E+00	0.00000	-.88575E-01	0.00000	-.55696E-13	0.00000	-.24047E-12	0.00000
-.90110E-14	0.00000	-.27268E-11	0.00000	.16594E+00	0.00000	.88575E-01	0.00000	.10250E-12	0.00000	.57299E-13	0.00000
.44663E-13	0.00000	-.59593E-11	0.00000	-.16594E+00	0.00000	-.88575E-01	0.00000	.95664E-13	0.00000	.22450E-13	0.00000
.25507E-13	0.00000	.44039E-11	0.00000	-.10043E+00	0.00000	-.19340E+00	0.00000	-.31537E-13	0.00000	.42310E-13	0.00000
.33851E-13	0.00000	.95946E-11	0.00000	.10043E+00	0.00000	.19340E+00	0.00000	.12350E-13	0.00000	-.20595E-12	0.00000
-.35076E-13	0.00000	.15666E-11	0.00000	.21642E-01	0.00000	.28560E+00	0.00000	.68765E-13	0.00000	-.53388E-13	0.00000
-.30344E-13	0.00000	-.15909E-11	0.00000	-.21642E-01	0.00000	-.28560E+00	0.00000	-.58947E-13	0.00000	-.11906E-12	0.00000
-.14861E-13	0.00000	-.68161E-11	0.00000	.11115E+00	0.00000	-.18471E+00	0.00000	-.58602E-14	0.00000	.63535E-13	0.00000
-.60355E-13	0.00000	-.71840E-11	0.00000	-.11115E+00	0.00000	.18471E+00	0.00000	.35172E-13	0.00000	.19607E-13	0.00000
.46748E-13	0.00000	.39793E-11	0.00000	-.11712E+00	0.00000	.17968E+00	0.00000	-.51605E-13	0.00000	-.30793E-13	0.00000
.35990E-14	0.00000	.55285E-11	0.00000	.11712E+00	0.00000	-.17968E+00	0.00000	-.71804E-13	0.00000	.78346E-13	0.00000

NATURAL FREQUENCY= .151740E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.16652E-13	0.00000	-.87521E-01	0.00000	-.65868E-02	0.00000	-.11556E+00	0.00000	.12482E-13	0.00000	.19392E-13	0.00000
-.19029E-13	0.00000	.87521E-01	0.00000	-.65868E-02	0.00000	-.11556E+00	0.00000	.21780E-14	0.00000	.82075E-14	0.00000
.34198E-13	0.00000	.97171E-02	0.00000	-.28685E-01	0.00000	.40752E-01	0.00000	-.40107E-13	0.00000	-.62343E-13	0.00000
.31733E-14	0.00000	-.97171E-02	0.00000	-.28685E-01	0.00000	.40752E-01	0.00000	-.48509E-13	0.00000	.71383E-13	0.00000
-.25560E-14	0.00000	.11461E+00	0.00000	.43830E-01	0.00000	-.25051E+00	0.00000	-.63622E-13	0.00000	-.67277E-13	0.00000
-.39952E-13	0.00000	-.11461E+00	0.00000	.43830E-01	0.00000	-.25051E+00	0.00000	.39894E-13	0.00000	-.82064E-13	0.00000
-.35891E-13	0.00000	-.17342E+00	0.00000	.26675E-01	0.00000	.30184E+00	0.00000	.10177E-12	0.00000	-.67522E-13	0.00000
-.22392E-13	0.00000	.17342E+00	0.00000	.26675E-01	0.00000	.30184E+00	0.00000	-.37076E-13	0.00000	.21039E-12	0.00000
.55918E-13	0.00000	.82055E-01	0.00000	-.93702E-01	0.00000	-.14026E+00	0.00000	-.67921E-13	0.00000	-.60753E-13	0.00000
.28380E-13	0.00000	-.82055E-01	0.00000	-.93702E-01	0.00000	-.14026E+00	0.00000	.17491E-13	0.00000	.12637E-12	0.00000
-.31662E-13	0.00000	.82055E-01	0.00000	.93702E-01	0.00000	-.14026E+00	0.00000	.26715E-13	0.00000	-.23991E-12	0.00000
-.86837E-14	0.00000	-.82055E-01	0.00000	.93702E-01	0.00000	-.14026E+00	0.00000	.64391E-13	0.00000	.61183E-13	0.00000
-.33245E-13	0.00000	-.17342E+00	0.00000	-.26675E-01	0.00000	.30184E+00	0.00000	.26354E-14	0.00000	.38029E-13	0.00000
-.42903E-13	0.00000	.17342E+00	0.00000	-.26675E-01	0.00000	.30184E+00	0.00000	-.60809E-13	0.00000	.22666E-12	0.00000
.59757E-13	0.00000	.11461E+00	0.00000	-.43830E-01	0.00000	-.25051E+00	0.00000	-.61108E-15	0.00000	.42753E-13	0.00000
.57486E-13	0.00000	-.11461E+00	0.00000	-.43830E-01	0.00000	-.25051E+00	0.00000	.58662E-13	0.00000	.14130E-12	0.00000
.14529E-13	0.00000	.97171E-02	0.00000	.28685E-01	0.00000	.40752E-01	0.00000	-.17716E-13	0.00000	-.23402E-12	0.00000
.12793E-13	0.00000	-.97171E-02	0.00000	.28685E-01	0.00000	.40752E-01	0.00000	-.48579E-13	0.00000	-.37418E-13	0.00000
-.45068E-13	0.00000	-.87521E-01	0.00000	.65868E-02	0.00000	-.11556E+00	0.00000	.67296E-14	0.00000	.76392E-14	0.00000
-.10294E-13	0.00000	.87521E-01	0.00000	.65868E-02	0.00000	-.11556E+00	0.00000	-.60842E-14	0.00000	-.63607E-13	0.00000

NATURAL FREQUENCY= .15291BE+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.37640E-13	0.00000	-.14757E-01	0.00000	.69554E-02	0.00000	.49571E-02	0.00000	.25969E-13	0.00000	.37084E-14	0.00000
-.46993E-13	0.00000	.14757E-01	0.00000	.69554E-02	0.00000	.49571E-02	0.00000	-.73729E-13	0.00000	.24865E-13	0.00000
.49653E-13	0.00000	.18401E-01	0.00000	-.29677E-01	0.00000	.14941E-01	0.00000	-.37649E-13	0.00000	-.19254E-12	0.00000
-.34360E-13	0.00000	-.18401E-01	0.00000	-.29677E-01	0.00000	.14941E-01	0.00000	-.26956E-13	0.00000	.24422E-12	0.00000
.54598E-13	0.00000	.24173E-01	0.00000	.53675E-01	0.00000	-.11626E+00	0.00000	-.13168E-12	0.00000	-.15179E-12	0.00000
-.61228E-13	0.00000	-.24173E-01	0.00000	.53675E-01	0.00000	-.11626E+00	0.00000	-.40306E-13	0.00000	.19396E-12	0.00000
.51934E-14	0.00000	-.95841E-01	0.00000	-.53365E-01	0.00000	.26080E+00	0.00000	.40052E-13	0.00000	-.26074E-12	0.00000
-.36575E-14	0.00000	.95841E-01	0.00000	-.53365E-01	0.00000	.26080E+00	0.00000	.43891E-13	0.00000	.30899E-12	0.00000
.42757E-13	0.00000	.15058E+00	0.00000	.22411E-01	0.00000	-.36717E+00	0.00000	-.46470E-14	0.00000	-.33085E-12	0.00000
-.13449E-13	0.00000	-.15058E+00	0.00000	.22411E-01	0.00000	-.36717E+00	0.00000	-.55002E-13	0.00000	.36538E-12	0.00000
.75118E-14	0.00000	-.15058E+00	0.00000	.22411E-01	0.00000	.36717E+00	0.00000	.33244E-13	0.00000	-.37188E-12	0.00000
.30673E-14	0.00000	.15058E+00	0.00000	.22411E-01	0.00000	.36717E+00	0.00000	-.47677E-13	0.00000	.29952E-12	0.00000
-.22957E-13	0.00000	.95841E-01	0.00000	-.53365E-01	0.00000	-.26080E+00	0.00000	-.32569E-13	0.00000	-.25075E-12	0.00000
-.24195E-13	0.00000	-.95841E-01	0.00000	-.53365E-01	0.00000	-.26080E+00	0.00000	-.21649E-13	0.00000	.35390E-12	0.00000
-.21618E-13	0.00000	-.24173E-01	0.00000	.53675E-01	0.00000	.11626E+00	0.00000	.63769E-13	0.00000	-.16673E-12	0.00000
.71707E-13	0.00000	.24173E-01	0.00000	.53675E-01	0.00000	.11626E+00	0.00000	.76307E-13	0.00000	.24890E-12	0.00000
-.25676E-13	0.00000	-.18401E-01	0.00000	-.29677E-01	0.00000	-.14941E-01	0.00000	-.33828E-13	0.00000	-.31149E-12	0.00000
.10234E-13	0.00000	.18401E-01	0.00000	-.29677E-01	0.00000	-.14941E-01	0.00000	-.31739E-14	0.00000	.23759E-12	0.00000
-.44998E-13	0.00000	.14757E-01	0.00000	.69554E-02	0.00000	-.49571E-02	0.00000	.14538E-13	0.00000	.93911E-14	0.00000
.39673E-13	0.00000	-.14757E-01	0.00000	.69554E-02	0.00000	-.49571E-02	0.00000	-.15038E-13	0.00000	.16297E-13	0.00000

NATURAL FREQUENCY= .15304E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.46497E-01	0.00000	-.32466E-13	0.00000	.37062E-13	0.00000	.32079E-13	0.00000	-.33416E-01	0.00000	-.96993E-02	0.00000
.46497E-01	0.00000	-.51476E-13	0.00000	-.90361E-13	0.00000	-.57295E-13	0.00000	-.33416E-01	0.00000	.96998E-02	0.00000
.24819E-01	0.00000	-.10247E-13	0.00000	.36222E-13	0.00000	.18404E-13	0.00000	-.15475E-02	0.00000	-.18734E+00	0.00000
.24819E-01	0.00000	.40582E-15	0.00000	.59107E-13	0.00000	-.15742E-12	0.00000	-.15475E-02	0.00000	.18734E+00	0.00000
.33860E-01	0.00000	-.30909E-13	0.00000	-.11274E-12	0.00000	.89065E-13	0.00000	-.35262E-01	0.00000	-.18975E+00	0.00000
.33860E-01	0.00000	.24123E-13	0.00000	-.17461E-13	0.00000	.84247E-13	0.00000	-.35262E-01	0.00000	.18975E+00	0.00000
.96133E-02	0.00000	.24718E-13	0.00000	.34455E-13	0.00000	-.14249E-12	0.00000	.96385E-02	0.00000	-.29149E+00	0.00000
.96133E-02	0.00000	-.72012E-13	0.00000	.23710E-13	0.00000	-.12497E-12	0.00000	.96385E-02	0.00000	.29148E+00	0.00000
.12679E-01	0.00000	-.48152E-13	0.00000	-.37021E-13	0.00000	.13450E-12	0.00000	-.22774E-01	0.00000	-.29538E+00	0.00000
.12679E-01	0.00000	.86485E-13	0.00000	.23529E-13	0.00000	.19393E-12	0.00000	-.22774E-01	0.00000	.29538E+00	0.00000
.12679E-01	0.00000	.56720E-13	0.00000	.13430E-13	0.00000	-.26393E-12	0.00000	.22774E-01	0.00000	-.29538E+00	0.00000
.12679E-01	0.00000	-.46684E-13	0.00000	-.30449E-13	0.00000	-.14774E-12	0.00000	.22774E-01	0.00000	.29538E+00	0.00000
.96133E-02	0.00000	-.31789E-13	0.00000	.65964E-14	0.00000	.11035E-12	0.00000	-.96385E-02	0.00000	-.29148E+00	0.00000
.96133E-02	0.00000	.28181E-13	0.00000	.32295E-13	0.00000	.10718E-12	0.00000	-.96385E-02	0.00000	.29148E+00	0.00000
.33860E-01	0.00000	.42888E-13	0.00000	.88876E-14	0.00000	-.10201E-12	0.00000	.35262E-01	0.00000	-.18975E+00	0.00000
.33860E-01	0.00000	-.12140E-13	0.00000	-.14483E-13	0.00000	-.17906E-13	0.00000	.35262E-01	0.00000	.18975E+00	0.00000
.24819E-01	0.00000	-.18074E-13	0.00000	.13308E-13	0.00000	.81109E-13	0.00000	.15475E-02	0.00000	-.18734E+00	0.00000
.24819E-01	0.00000	.78450E-14	0.00000	.49943E-13	0.00000	.14703E-12	0.00000	.15475E-02	0.00000	.18734E+00	0.00000
.46497E-01	0.00000	.22898E-13	0.00000	-.42103E-14	0.00000	.72250E-13	0.00000	.33416E-01	0.00000	-.96998E-02	0.00000
.46497E-01	0.00000	-.27757E-13	0.00000	-.64952E-13	0.00000	.10813E-12	0.00000	.33416E-01	0.00000	.96998E-02	0.00000

NATURAL FREQUENCY= .155597E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.90473E-01	0.00000	.24090E-14	0.00000	.46943E-13	0.00000	.48564E-13	0.00000	.66668E-01	0.00000	.35687E-01	0.00000
.90473E-01	0.00000	-.14545E-14	0.00000	-.69895E-14	0.00000	.17594E-13	0.00000	.66668E-01	0.00000	-.35687E-01	0.00000
.73501E-02	0.00000	-.73917E-13	0.00000	-.43952E-14	0.00000	.48405E-13	0.00000	-.21675E-01	0.00000	.32823E+00	0.00000
.73501E-02	0.00000	-.67378E-14	0.00000	-.42976E-13	0.00000	.72027E-13	0.00000	-.21675E-01	0.00000	-.32823E+00	0.00000
.93726E-02	0.00000	.23835E-13	0.00000	-.55090E-13	0.00000	-.67056E-13	0.00000	.27474E-01	0.00000	.21133E+00	0.00000
.93726E-02	0.00000	.76268E-14	0.00000	.15958E-13	0.00000	-.74095E-13	0.00000	.27474E-01	0.00000	-.21133E+00	0.00000
.48714E-01	0.00000	.16813E-13	0.00000	.37778E-13	0.00000	.19881E-13	0.00000	-.42362E-01	0.00000	.27330E+00	0.00000
-.48714E-01	0.00000	.17701E-13	0.00000	-.27021E-13	0.00000	.88721E-14	0.00000	-.42362E-01	0.00000	-.27330E+00	0.00000
.58482E-01	0.00000	-.18864E-14	0.00000	-.16675E-13	0.00000	-.46183E-13	0.00000	-.30105E-01	0.00000	.31877E-01	0.00000
-.58482E-01	0.00000	.20973E-13	0.00000	.16805E-13	0.00000	-.18482E-13	0.00000	-.30105E-01	0.00000	-.31877E-01	0.00000
.58482E-01	0.00000	-.14121E-13	0.00000	-.23415E-14	0.00000	-.40752E-13	0.00000	-.30105E-01	0.00000	-.31877E-01	0.00000
-.58482E-01	0.00000	-.12319E-13	0.00000	.22353E-14	0.00000	-.87694E-13	0.00000	-.30105E-01	0.00000	.31877E-01	0.00000
.48714E-01	0.00000	-.18395E-13	0.00000	.25525E-14	0.00000	-.53870E-13	0.00000	-.42362E-01	0.00000	-.27330E+00	0.00000
-.48714E-01	0.00000	.12445E-13	0.00000	-.21512E-14	0.00000	-.51115E-13	0.00000	-.42362E-01	0.00000	.27330E+00	0.00000
-.93726E-02	0.00000	.22217E-13	0.00000	-.88637E-14	0.00000	.22864E-14	0.00000	.27474E-01	0.00000	-.21133E+00	0.00000
.93726E-02	0.00000	.39837E-13	0.00000	.34676E-13	0.00000	-.51633E-14	0.00000	.27474E-01	0.00000	.21133E+00	0.00000
-.73501E-02	0.00000	-.53440E-13	0.00000	.13467E-13	0.00000	-.74262E-13	0.00000	-.21675E-01	0.00000	-.32823E+00	0.00000
.73501E-02	0.00000	-.60161E-13	0.00000	-.94772E-14	0.00000	.11042E-12	0.00000	-.21675E-01	0.00000	.32823E+00	0.00000
-.90473E-01	0.00000	.12838E-13	0.00000	.80114E-14	0.00000	.24802E-15	0.00000	.66668E-01	0.00000	-.35687E-01	0.00000
.90473E-01	0.00000	.44969E-13	0.00000	-.31428E-13	0.00000	-.10422E-13	0.00000	.66668E-01	0.00000	.35687E-01	0.00000

NATURAL FREQUENCY= .157931E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.72324E-14	0.00000	.19912E-12	0.00000	.10382E+00	0.00000	.13253E+00	0.00000	-.49796E-13	0.00000	.40617E-13	0.00000
-.24766E-13	0.00000	-.11666E-12	0.00000	-.10382E+00	0.00000	-.13253E+00	0.00000	-.27859E-13	0.00000	.27885E-14	0.00000
.25444E-13	0.00000	-.16095E-12	0.00000	-.12775E+00	0.00000	-.92391E-01	0.00000	.22559E-13	0.00000	.12835E-12	0.00000
-.36771E-13	0.00000	-.14612E-13	0.00000	.12775E+00	0.00000	.92391E-01	0.00000	.12679E-13	0.00000	-.42886E-14	0.00000
-.13768E-13	0.00000	.17404E-14	0.00000	.77042E-01	0.00000	.23456E+00	0.00000	.27333E-13	0.00000	-.58748E-13	0.00000
.17093E-13	0.00000	.10858E-13	0.00000	-.77042E-01	0.00000	-.23456E+00	0.00000	.28811E-13	0.00000	.20276E-12	0.00000
.22384E-13	0.00000	.10277E-12	0.00000	-.64996E-01	0.00000	-.23760E+00	0.00000	-.18971E-13	0.00000	.31726E-13	0.00000
.22326E-13	0.00000	.89153E-13	0.00000	.64996E-01	0.00000	.23760E+00	0.00000	.43275E-14	0.00000	.12430E-12	0.00000
.16870E-13	0.00000	-.10708E-13	0.00000	.11881E-01	0.00000	.28338E+00	0.00000	.40016E-14	0.00000	-.99939E-13	0.00000
-.56600E-13	0.00000	-.83122E-13	0.00000	-.11881E-01	0.00000	-.28338E+00	0.00000	-.28674E-13	0.00000	.12804E-13	0.00000
-.57109E-13	0.00000	-.84063E-13	0.00000	.11881E-01	0.00000	-.28338E+00	0.00000	.67103E-13	0.00000	.23769E-13	0.00000
.48490E-13	0.00000	.91595E-14	0.00000	-.11881E-01	0.00000	.28338E+00	0.00000	.94705E-13	0.00000	-.25429E-12	0.00000
-.50284E-13	0.00000	.97196E-13	0.00000	-.64996E-01	0.00000	.23760E+00	0.00000	-.58040E-14	0.00000	-.18199E-13	0.00000
-.40820E-13	0.00000	.37256E-13	0.00000	.64996E-01	0.00000	-.23760E+00	0.00000	-.12308E-13	0.00000	-.38234E-15	0.00000
.45928E-13	0.00000	.11019E-12	0.00000	.77042E-01	0.00000	-.23456E+00	0.00000	-.55808E-13	0.00000	.21194E-12	0.00000
-.95812E-14	0.00000	-.12983E-12	0.00000	-.77042E-01	0.00000	.23456E+00	0.00000	-.33391E-13	0.00000	-.57176E-13	0.00000
.25749E-13	0.00000	-.25083E-12	0.00000	-.12775E+00	0.00000	.92391E-01	0.00000	-.32610E-14	0.00000	-.15432E-12	0.00000
-.49050E-14	0.00000	.17118E-12	0.00000	.12775E+00	0.00000	-.92391E-01	0.00000	.33843E-14	0.00000	.59556E-15	0.00000
-.65217E-14	0.00000	.62306E-12	0.00000	.10382E+00	0.00000	-.13253E+00	0.00000	-.18949E-13	0.00000	-.21448E-14	0.00000
-.52024E-14	0.00000	-.54458E-12	0.00000	-.10382E+00	0.00000	.13253E+00	0.00000	-.12175E-13	0.00000	-.12305E-13	0.03000

NATURAL FREQUENCY= .15797bE+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.12895E+00	0.00000	.16112E-12	0.00000	-.61893E-12	0.00000	-.70330E-12	0.00000	.11096E+00	0.00000	.91801E-01	0.00000
.12895E+00	0.00000	-.14050E-12	0.00000	.69733E-12	0.00000	.10039E-11	0.00000	.11096E+00	0.00000	-.91801E-01	0.00000
.96196E-01	0.00000	-.10718E-12	0.00000	.81535E-12	0.00000	.90372E-12	0.00000	-.12843E+00	0.00000	.32178E+00	0.00000
-.96196E-01	0.00000	-.13329E-13	0.00000	-.83453E-12	0.00000	-.40383E-12	0.00000	-.12843E+00	0.00000	-.32178E+00	0.00000
.50639E-02	0.00000	.72362E-13	0.00000	-.50347E-12	0.00000	-.16360E-11	0.00000	.66254E-01	0.00000	.22914E-01	0.00000
-.50639E-02	0.00000	.37418E-13	0.00000	.45473E-12	0.00000	.15803E-11	0.00000	.66254E-01	0.00000	-.22914E-01	0.00000
.10813E+00	0.00000	.15047E-13	0.00000	.40269E-12	0.00000	.17100E-11	0.00000	-.12479E+00	0.00000	-.38728E-01	0.00000
-.10813E+00	0.00000	-.25704E-13	0.00000	-.35679E-12	0.00000	-.15382E-11	0.00000	-.12479E+00	0.00000	.38728E-01	0.00000
-.12705E-01	0.00000	-.30999E-13	0.00000	-.55505E-13	0.00000	-.18577E-11	0.00000	.62554E-01	0.00000	-.22528E+00	0.00000
.12705E-01	0.00000	.11554E-14	0.00000	.46536E-13	0.00000	.20502E-11	0.00000	.62554E-01	0.00000	.22528E+00	0.00000
.12705E-01	0.00000	.43164E-13	0.00000	-.12001E-12	0.00000	.19020E-11	0.00000	-.62554E-01	0.00000	-.22528E+00	0.00000
-.12705E-01	0.00000	.40283E-13	0.00000	.14339E-12	0.00000	-.18282E-11	0.00000	-.62554E-01	0.00000	.22528E+00	0.00000
-.10813E+00	0.00000	-.71725E-13	0.00000	.45769E-12	0.00000	-.16766E-11	0.00000	.12479E+00	0.00000	-.38728E-01	0.00000
.10813E+00	0.00000	-.10904E-13	0.00000	-.49329E-12	0.00000	.17474E-11	0.00000	.12479E+00	0.00000	.38728E-01	0.00000
-.50639E-02	0.00000	-.99966E-14	0.00000	-.53384E-12	0.00000	.16008E-11	0.00000	-.66254E-01	0.00000	.22914E-01	0.00000
.50639E-02	0.00000	-.43674E-14	0.00000	.47769E-12	0.00000	-.15190E-11	0.00000	-.66254E-01	0.00000	-.22914E-01	0.00000
-.96196E-01	0.00000	.80508E-14	0.00000	.89767E-12	0.00000	-.63618E-12	0.00000	.12843E+00	0.00000	.32178E+00	0.00000
.96196E-01	0.00000	.21323E-13	0.00000	-.85148E-12	0.00000	.66014E-12	0.00000	.12843E+00	0.00000	-.32178E+00	0.00000
.12895E+00	0.00000	-.16819E-14	0.00000	-.70669E-12	0.00000	.87945E-12	0.00000	-.11096E+00	0.00000	.91801E-01	0.00000
-.12895E+00	0.00000	-.19520E-13	0.00000	.68163E-12	0.00000	-.91192E-12	0.00000	-.11096E+00	0.00000	-.91801E-01	0.00000

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NATURAL FREQUENCY= .160082E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.11379E+00	0.00000	.74931E-11	0.00000	.33916E-11	0.00000	.10565E-10	0.00000	-.10671E+00	0.00000	-.10949E+00	0.00000
.11379E+00	0.00000	-.74260E-11	0.00000	.30715E-11	0.00000	.10422E-10	0.00000	-.10671E+00	0.00000	.10949E+00	0.00000
.16997E+00	0.00000	-.28227E-11	0.00000	-.22025E-11	0.00000	.12914E-10	0.00000	.17828E+00	0.00000	-.17926E+00	0.00000
.16997E+00	0.00000	.26676E-11	0.00000	-.21862E-11	0.00000	.12581E-10	0.00000	.17828E+00	0.00000	.17926E+00	0.00000
.12999E-01	0.00000	.16585E-11	0.00000	-.12333E-11	0.00000	-.27602E-11	0.00000	-.72438E-01	0.00000	.24119E+00	0.00000
.12999E-01	0.00000	-.16552E-11	0.00000	-.14505E-11	0.00000	-.30451E-11	0.00000	-.72438E-01	0.00000	-.24119E+00	0.00000
.33464E-01	0.00000	.33255E-12	0.00000	.76055E-12	0.00000	.24694E-11	0.00000	.60371E-01	0.00000	.10526E+00	0.00000
.33464E-01	0.00000	-.28553E-12	0.00000	.83536E-12	0.00000	.18759E-11	0.00000	.60371E-01	0.00000	-.10526E+00	0.00000
.76644E-01	0.00000	-.35072E-12	0.00000	-.45524E-12	0.00000	.80360E-12	0.00000	-.59503E-01	0.00000	.19501E+00	0.00000
.76644E-01	0.00000	.26811E-12	0.00000	-.54699E-12	0.00000	.42395E-12	0.00000	-.59503E-01	0.00000	-.19501E+00	0.00000
.76644E-01	0.00000	.21716E-12	0.00000	.15899E-12	0.00000	.30905E-13	0.00000	-.59503E-01	0.00000	-.19501E+00	0.00000
.76644E-01	0.00000	-.16876E-12	0.00000	.16092E-12	0.00000	-.66099E-12	0.00000	-.59503E-01	0.00000	.19501E+00	0.00000
.33464E-01	0.00000	.69750E-13	0.00000	-.22814E-12	0.00000	.13421E-11	0.00000	.60371E-01	0.00000	-.10526E+00	0.00000
.33464E-01	0.00000	-.14072E-13	0.00000	-.13852E-12	0.00000	.83485E-12	0.00000	.60371E-01	0.00000	.10526E+00	0.00000
.12999E-01	0.00000	.47899E-12	0.00000	.27913E-12	0.00000	-.89128E-12	0.00000	-.72438E-01	0.00000	-.24119E+00	0.00000
.12999E-01	0.00000	-.55814E-12	0.00000	.42537E-12	0.00000	-.12298E-11	0.00000	-.72438E-01	0.00000	.24119E+00	0.00000
.16997E+00	0.00000	-.85911E-12	0.00000	.72504E-12	0.00000	.42558E-11	0.00000	.17828E+00	0.00000	.17926E+00	0.00000
.16997E+00	0.00000	.94113E-12	0.00000	.85009E-12	0.00000	.42098E-11	0.00000	.17828E+00	0.00000	-.17926E+00	0.00000
.11379E+00	0.00000	.24965E-11	0.00000	-.10853E-11	0.00000	.35297E-11	0.00000	-.10671E+00	0.00000	.10949E+00	0.00000
.11379E+00	0.00000	-.25506E-11	0.00000	-.10852E-11	0.00000	.35639E-11	0.00000	-.10671E+00	0.00000	-.10949E+00	0.00000

NATURAL FREQUENCY= .160135E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.15581E-11	0.00000	-.19805E+00	0.00000	-.84855E-01	0.00000	-.27770E+00	0.00000	-.14396E-11	0.00000	-.15460E-11	0.00000
-.14996E-11	0.00000	.19805E+00	0.00000	-.84855E-01	0.00000	-.27770E+00	0.00000	-.14171E-11	0.00000	.15053E-11	0.00000
-.23568E-11	0.00000	.70834E-01	0.00000	.58832E-01	0.00000	-.33491E+00	0.00000	.24368E-11	0.00000	-.24508E-11	0.00000
.23758E-11	0.00000	-.70834E-01	0.00000	.58832E-01	0.00000	-.33491E+00	0.00000	.24777E-11	0.00000	.23577E-11	0.00000
.16943E-12	0.00000	-.43451E-01	0.00000	.33278E-01	0.00000	.77418E-01	0.00000	-.97385E-12	0.00000	.32647E-11	0.00000
-.15901E-12	0.00000	.43451E-01	0.00000	.33278E-01	0.00000	.77418E-01	0.00000	-.94913E-12	0.00000	-.34548E-11	0.00000
-.42816E-12	0.00000	-.73081E-02	0.00000	-.18752E-01	0.00000	-.64784E-01	0.00000	.81537E-12	0.00000	.14958E-11	0.00000
.42058E-12	0.00000	.73081E-02	0.00000	-.18752E-01	0.00000	-.64784E-01	0.00000	.80350E-12	0.00000	-.14944E-11	0.00000
.10383E-11	0.00000	.27128E-02	0.00000	.13149E-01	0.00000	-.57854E-02	0.00000	-.77427E-12	0.00000	.26352E-11	0.00000
-.10368E-11	0.00000	-.27128E-02	0.00000	.13149E-01	0.00000	-.57854E-02	0.00000	-.75764E-12	0.00000	-.26130E-11	0.00000
.10787E-11	0.00000	.27128E-02	0.00000	-.13149E-01	0.00000	-.57854E-02	0.00000	-.89821E-12	0.00000	-.27586E-11	0.00000
-.11079E-11	0.00000	-.27128E-02	0.00000	-.13149E-01	0.00000	-.57854E-02	0.00000	-.87752E-12	0.00000	.28634E-11	0.00000
-.47542E-12	0.00000	-.73081E-02	0.00000	.18752E-01	0.00000	-.64784E-01	0.00000	.85885E-12	0.00000	-.14051E-11	0.00000
.50738E-12	0.00000	.73081E-02	0.00000	.18752E-01	0.00000	-.64784E-01	0.00000	.88763E-12	0.00000	.13814E-11	0.00000
.20276E-12	0.00000	-.43451E-01	0.00000	-.33274E-01	0.00000	.77418E-01	0.00000	-.99750E-12	0.00000	-.33822E-11	0.00000
-.24242E-12	0.00000	.43451E-01	0.00000	-.33278E-01	0.00000	.77418E-01	0.00000	-.10214E-11	0.00000	.33984E-11	0.00000
-.22796E-11	0.00000	.70834E-01	0.00000	-.58832E-01	0.00000	-.33491E+00	0.00000	.24025E-11	0.00000	.23357E-11	0.00000
.23052E-11	0.00000	-.70834E-01	0.00000	-.58832E-01	0.00000	-.33491E+00	0.00000	.24145E-11	0.00000	-.23068E-11	0.00000
.14751E-11	0.00000	-.19805E+00	0.00000	.84855E-01	0.00000	-.27770E+00	0.00000	-.14133E-11	0.00000	.14478E-11	0.00000
-.15022E-11	0.00000	.19805E+00	0.00000	.84855E-01	0.00000	-.27770E+00	0.00000	-.14138E-11	0.00000	-.14620E-11	0.00000

NATURAL FREQUENCY= .160187E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.10050E-11	0.00000	.19841E+00	0.00000	.84720E-01	0.00000	.27677E+00	0.00000	.92087E-12	0.00000	.96170E-12	0.00000
.99603E-12	0.00000	-.19841E+00	0.00000	.84720E-01	0.00000	.27677E+00	0.00000	.94127E-12	0.00000	-.96077E-12	0.00000
.15170E-11	0.00000	-.72294E-01	0.00000	-.57525E-01	0.00000	.33657E+00	0.00000	-.15461E-11	0.00000	.16461E-11	0.00000
-.15174E-11	0.00000	.72294E-01	0.00000	-.57525E-01	0.00000	.33657E+00	0.00000	-.15695E-11	0.00000	-.16059E-11	0.00000
-.80841E-13	0.00000	.44741E-01	0.00000	-.37526E-01	0.00000	-.74027E-01	0.00000	.58231E-12	0.00000	-.22554E-11	0.00000
.68200E-13	0.00000	-.44741E-01	0.00000	-.37526E-01	0.00000	-.74027E-01	0.00000	.55809E-12	0.00000	.23055E-11	0.00000
.25461E-12	0.00000	.10557E-01	0.00000	.23357E-01	0.00000	.42776E-01	0.00000	-.47287E-12	0.00000	-.93597E-12	0.00000
-.24083E-12	0.00000	-.10557E-01	0.00000	.23357E-01	0.00000	.42776E-01	0.00000	-.50841E-12	0.00000	.97790E-12	0.00000
-.65561E-12	0.00000	-.19493E-01	0.00000	-.13027E-01	0.00000	.37021E-01	0.00000	.51093E-12	0.00000	-.18379E-11	0.00000
.69732E-12	0.00000	.19493E-01	0.00000	-.13027E-01	0.00000	.37021E-01	0.00000	.46193E-12	0.00000	.17310E-11	0.00000
-.73965E-12	0.00000	.19493E-01	0.00000	-.13027E-01	0.00000	-.37021E-01	0.00000	.61712E-12	0.00000	.17334E-11	0.00000
.75891E-12	0.00000	-.19493E-01	0.00000	-.13027E-01	0.00000	-.37021E-01	0.00000	.58983E-12	0.00000	-.19797E-11	0.00000
.30063E-12	0.00000	-.10557E-01	0.00000	.23357E-01	0.00000	-.42776E-01	0.00000	-.60475E-12	0.00000	.88801E-12	0.00000
-.39477E-12	0.00000	.10557E-01	0.00000	.23357E-01	0.00000	-.42776E-01	0.00000	-.62292E-12	0.00000	-.88773E-12	0.00000
-.13018E-12	0.00000	-.44741E-01	0.00000	-.37526E-01	0.00000	.74027E-01	0.00000	.69330E-12	0.00000	.23152E-11	0.00000
.17854E-12	0.00000	.44741E-01	0.00000	-.37526E-01	0.00000	.74027E-01	0.00000	.67091E-12	0.00000	-.22133E-11	0.00000
.15443E-11	0.00000	.72294E-01	0.00000	-.57525E-01	0.00000	-.33657E+00	0.00000	-.16388E-11	0.00000	-.15991E-11	0.00000
-.15350E-11	0.00000	-.72294E-01	0.00000	-.57525E-01	0.00000	-.33657E+00	0.00000	-.16156E-11	0.00000	.15461E-11	0.00000
-.10077E-11	0.00000	-.19841E+00	0.00000	.84720E-01	0.00000	-.27677E+00	0.00000	.95356E-12	0.00000	-.96660E-12	0.00000
.10206E-11	0.00000	.19841E+00	0.00000	.84720E-01	0.00000	-.27677E+00	0.00000	.97691E-12	0.00000	.96093E-12	0.00000

NATURAL FREQUENCY= .161127E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.21807E-01	0.00000	.97755E-13	0.00000	.36082E-13	0.00000	.73985E-13	0.00000	.45997E-01	0.00000	.63308E-01	0.00000
.21807E-01	0.00000	-.56817E-14	0.00000	-.57438E-13	0.00000	.12605E-13	0.00000	.45997E-01	0.00000	-.63308E-01	0.00000
.14481E+00	0.00000	-.15859E-12	0.00000	-.35356E-13	0.00000	.92650E-13	0.00000	-.16273E+00	0.00000	-.16875E+00	0.00000
-.14481E+00	0.00000	-.25111E-13	0.00000	.32789E-13	0.00000	-.56063E-13	0.00000	-.16273E+00	0.00000	.16875E+00	0.00000
-.13194E+00	0.00000	.80229E-13	0.00000	.53590E-13	0.00000	-.12996E-13	0.00000	.16680E+00	0.00000	-.18496E+00	0.00000
.13194E+00	0.00000	.19362E-13	0.00000	-.37725E-13	0.00000	-.24348E-13	0.00000	.16680E+00	0.00000	.18496E+00	0.00000
.23721E-01	0.00000	.29257E-13	0.00000	-.61338E-13	0.00000	.36620E-13	0.00000	-.10418E+00	0.00000	-.80572E-02	0.00000
-.23721E-01	0.00000	.40153E-13	0.00000	.44368E-13	0.00000	.42649E-14	0.00000	-.10418E+00	0.00000	.80572E-02	0.00000
-.13725E+00	0.00000	-.13371E-12	0.00000	.60422E-13	0.00000	.14063E-13	0.00000	.17352E+00	0.00000	.17342E+00	0.00000
.13725E+00	0.00000	-.10451E-12	0.00000	-.56747E-13	0.00000	-.15446E-13	0.00000	.17352E+00	0.00000	-.17342E+00	0.00000
.13725E+00	0.00000	.12961E-12	0.00000	-.81651E-13	0.00000	.39156E-14	0.00000	-.17352E+00	0.00000	.17342E+00	0.00000
-.13725E+00	0.00000	.13955E-12	0.00000	.91369E-13	0.00000	-.41763E-13	0.00000	-.17352E+00	0.00000	-.17342E+00	0.00000
-.23721E-01	0.00000	-.45215E-13	0.00000	.29827E-13	0.00000	-.76082E-13	0.00000	.10418E+00	0.00000	-.80572E-02	0.00000
.23721E-01	0.00000	-.25138E-13	0.00000	-.12670E-13	0.00000	.74660E-13	0.00000	.10418E+00	0.00000	.80572E-02	0.00000
.13194E+00	0.00000	-.61301E-13	0.00000	-.63059E-13	0.00000	-.66568E-13	0.00000	-.16680E+00	0.00000	-.18496E+00	0.00000
-.13194E+00	0.00000	-.65736E-13	0.00000	.84710E-13	0.00000	.10522E-12	0.00000	-.16680E+00	0.00000	.18496E+00	0.00000
-.14481E+00	0.00000	.13199E-12	0.00000	.56198E-13	0.00000	-.11558E-12	0.00000	.16273E+00	0.00000	-.16875E+00	0.00000
.14481E+00	0.00000	.75672E-13	0.00000	-.94981E-13	0.00000	.17780E-12	0.00000	.16273E+00	0.00000	.16875E+00	0.00000
.21807E-01	0.00000	-.81976E-13	0.00000	.16865E-13	0.00000	.12057E-13	0.00000	-.45997E-01	0.00000	.63308E-01	0.00000
-.21807E-01	0.00000	-.46618E-13	0.00000	-.18299E-13	0.00000	-.28098E-13	0.00000	-.45997E-01	0.00000	-.63308E-01	0.00000

NATURAL FREQUENCY= .162701E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.13373E-12	0.00000	.39472E-12	0.00000	.80275E-01	0.00000	.23335E-01	0.00000	.15018E-12	0.00000	.12968E-12	0.00000
.17266E-12	0.00000	-.32401E-12	0.00000	-.80275E-01	0.00000	-.23335E-01	0.00000	.15791E-12	0.00000	-.14375E-12	0.00000
.22153E-12	0.00000	-.20092E-12	0.00000	.29536E-01	0.00000	.17868E+00	0.00000	-.28179E-12	0.00000	.18793E-12	0.00000
-.24661E-12	0.00000	-.67654E-14	0.00000	-.29536E-01	0.00000	-.17868E+00	0.00000	-.23209E-12	0.00000	-.29465E-12	0.00000
.17332E-14	0.00000	.16068E-12	0.00000	.60646E-01	0.00000	.19818E+00	0.00000	.92291E-13	0.00000	-.25534E-12	0.00000
-.66549E-15	0.00000	.12784E-13	0.00000	-.60646E-01	0.00000	-.19818E+00	0.00000	.66666E-13	0.00000	.21944E-12	0.00000
.76756E-13	0.00000	.26215E-13	0.00000	.58803E-02	0.00000	.28376E+00	0.00000	-.95035E-13	0.00000	-.12341E-12	0.00000
-.68284E-13	0.00000	.62183E-15	0.00000	-.58803E-02	0.00000	-.28376E+00	0.00000	-.88033E-13	0.00000	.12415E-12	0.00000
-.96267E-13	0.00000	-.12805E-12	0.00000	.28254E-01	0.00000	.29383E+00	0.00000	.68810E-13	0.00000	-.28585E-12	0.00000
.70226E-13	0.00000	-.30070E-13	0.00000	-.28254E-01	0.00000	-.29383E+00	0.00000	.70788E-13	0.00000	.31264E-12	0.00000
-.64590E-13	0.00000	.15421E-12	0.00000	-.28254E-01	0.00000	.29383E+00	0.00000	.24800E-13	0.00000	.15307E-12	0.00000
.86314E-13	0.00000	.41991E-13	0.00000	.28254E-01	0.00000	-.29383E+00	0.00000	.40727E-13	0.00000	-.12639E-12	0.00000
.27957E-13	0.00000	-.10853E-12	0.00000	-.58803E-02	0.00000	.28376E+00	0.00000	-.51271E-13	0.00000	-.67209E-14	0.00000
-.94145E-14	0.00000	.14571E-13	0.00000	.58803E-02	0.00000	-.28376E+00	0.00000	-.37249E-13	0.00000	-.39219E-13	0.00000
-.21506E-13	0.00000	-.13167E-12	0.00000	-.60646E-01	0.00000	.19818E+00	0.00000	.94805E-13	0.00000	.19082E-12	0.00000
.25738E-13	0.00000	.12663E-13	0.00000	.60646E-01	0.00000	-.19818E+00	0.00000	.60177E-13	0.00000	-.22907E-12	0.00000
.15210E-12	0.00000	.22389E-12	0.00000	-.29536E-01	0.00000	.17868E+00	0.00000	-.14559E-12	0.00000	-.22127E-12	0.00000
-.13707E-12	0.00000	.94881E-14	0.00000	.29536E-01	0.00000	-.17868E+00	0.00000	-.14708E-12	0.00000	.17061E-12	0.00000
-.99578E-13	0.00000	-.39919E-12	0.00000	-.80275E-01	0.00000	.23335E-01	0.00000	.88147E-13	0.00000	-.67342E-13	0.00000
.79901E-13	0.00000	.26543E-12	0.00000	.80275E-01	0.00000	-.23335E-01	0.00000	.79753E-13	0.00000	.89183E-13	0.00000

NATURAL FREQUENCY= .163565E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.63081E-01	0.00000	-.13411E-12	0.00000	.20810E-13	0.00000	-.69202E-13	0.00000	.48103E-01	0.00000	.55938E-01	0.00000
.63081E-01	0.00000	.44469E-13	0.00000	-.31364E-13	0.00000	-.29878E-13	0.00000	.48103E-01	0.00000	-.55938E-01	0.00000
.96988E-01	0.00000	.80882E-13	0.00000	.20365E-13	0.00000	.93992E-13	0.00000	-.64074E-01	0.00000	.14820E+00	0.00000
-.96988E-01	0.00000	.10804E-13	0.00000	.99494E-14	0.00000	-.15910E-12	0.00000	-.64074E-01	0.00000	-.14820E+00	0.00000
.57561E-01	0.00000	-.67821E-13	0.00000	-.75338E-13	0.00000	-.55173E-13	0.00000	-.65180E-01	0.00000	-.32431E+00	0.00000
-.57561E-01	0.00000	-.30401E-13	0.00000	.10963E-12	0.00000	.18608E-12	0.00000	-.65180E-01	0.00000	.32431E+00	0.00000
-.17042E+00	0.00000	.67886E-13	0.00000	.10011E-12	0.00000	.91719E-13	0.00000	.16830E+00	0.00000	.46994E-01	0.00000
.17042E+00	0.00000	.11807E-13	0.00000	-.70800E-13	0.00000	.60500E-13	0.00000	.16830E+00	0.00000	-.46994E-01	0.00000
.94519E-01	0.00000	.61680E-13	0.00000	-.10266E-12	0.00000	.60242E-13	0.00000	-.13947E+00	0.00000	.90037E-01	0.00000
-.94519E-01	0.00000	-.22091E-13	0.00000	.98248E-13	0.00000	.18055E-12	0.00000	-.13947E+00	0.00000	-.90037E-01	0.00000
-.94519E-01	0.00000	.16195E-13	0.00000	.60003E-13	0.00000	.27440E-13	0.00000	.13947E+00	0.00000	.90037E-01	0.00000
.94519E-01	0.00000	-.64817E-13	0.00000	-.42397E-13	0.00000	.20332E-12	0.00000	.13947E+00	0.00000	-.90037E-01	0.00000
.17042E+00	0.00000	.20536E-13	0.00000	-.12700E-13	0.00000	-.69904E-14	0.00000	-.16830E+00	0.00000	.46994E-01	0.00000
-.17042E+00	0.00000	-.27039E-13	0.00000	.23182E-13	0.00000	.16444E-12	0.00000	-.16830E+00	0.00000	-.46994E-01	0.00000
-.57561E-01	0.00000	.57189E-13	0.00000	.54502E-13	0.00000	.10169E-12	0.00000	.65180E-01	0.00000	-.32431E+00	0.00000
.57561E-01	0.00000	-.18621E-13	0.00000	-.88369E-13	0.00000	.72941E-13	0.00000	.65180E-01	0.00000	.32431E+00	0.00000
-.96988E-01	0.00000	-.91321E-14	0.00000	-.93378E-13	0.00000	.28081E-13	0.00000	.64074E-01	0.00000	.14820E+00	0.00000
.96988E-01	0.00000	-.10282E-12	0.00000	.57987E-13	0.00000	.80367E-13	0.00000	.64074E-01	0.00000	-.14820E+00	0.00000
.63081E-01	0.00000	-.25485E-14	0.00000	.59018E-13	0.00000	-.70599E-13	0.00000	-.48103E-01	0.00000	.55938E-01	0.00000
-.63081E-01	0.00000	.32650E-13	0.00000	-.41942E-13	0.00000	.18886E-13	0.00000	-.48103E-01	0.00000	-.55938E-01	0.00000

NATURAL FREQUENCY= .163588E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.16346E-01	0.00000	.69867E-13	0.00000	.12983E-13	0.00000	.73511E-13	0.00000	.12104E-01	0.00000	.28535E-01	0.00000
.16346E-01	0.00000	-.49967E-13	0.00000	-.45638E-13	0.00000	.27921E-13	0.00000	.12104E-01	0.00000	-.28535E-01	0.00000
.95209E-01	0.00000	-.62613E-14	0.00000	-.65077E-13	0.00000	.90931E-13	0.00000	-.11148E+00	0.00000	-.25096E+00	0.00000
.95209E-01	0.00000	.85234E-13	0.00000	.36764E-13	0.00000	-.43657E-14	0.00000	-.11148E+00	0.00000	.25096E+00	0.00000
.19275E+00	0.00000	-.14330E-13	0.00000	-.41716E-13	0.00000	-.17965E-12	0.00000	.17602E+00	0.00000	-.76847E-01	0.00000
.19275E+00	0.00000	-.23901E-13	0.00000	.17972E-13	0.00000	-.68152E-13	0.00000	.17602E+00	0.00000	.76847E-01	0.00000
.31666E-01	0.00000	-.40962E-13	0.00000	.30839E-13	0.00000	-.12774E-12	0.00000	-.60061E-01	0.00000	.29198E+00	0.00000
.31666E-01	0.00000	.48161E-13	0.00000	-.26289E-13	0.00000	-.15787E-12	0.00000	-.60061E-01	0.00000	-.29198E+00	0.00000
.49529E-01	0.00000	-.26222E-13	0.00000	-.32489E-13	0.00000	-.14016E-12	0.00000	-.16584E-01	0.00000	.18624E-01	0.00000
.49529E-01	0.00000	.43106E-13	0.00000	.53664E-14	0.00000	-.11001E-12	0.00000	-.16584E-01	0.00000	-.18624E-01	0.00000
.49529E-01	0.00000	-.65945E-14	0.00000	.40413E-13	0.00000	-.50784E-13	0.00000	-.16584E-01	0.00000	-.18624E-01	0.00000
.49529E-01	0.00000	-.35564E-13	0.00000	-.10389E-13	0.00000	-.46623E-13	0.00000	-.16584E-01	0.00000	.18624E-01	0.00000
.31666E-01	0.00000	.14109E-14	0.00000	-.35036E-15	0.00000	.13504E-13	0.00000	-.60061E-01	0.00000	-.29198E+00	0.00000
.31666E-01	0.00000	.16644E-13	0.00000	.16857E-13	0.00000	-.40407E-13	0.00000	-.60061E-01	0.00000	.29198E+00	0.00000
.19275E+00	0.00000	-.27633E-14	0.00000	-.11816E-13	0.00000	.21333E-13	0.00000	.17602E+00	0.00000	.76847E-01	0.00000
.19275E+00	0.00000	-.10699E-14	0.00000	.88301E-14	0.00000	-.21495E-14	0.00000	.17602E+00	0.00000	-.76847E-01	0.00000
.95209E-01	0.00000	.83253E-14	0.00000	-.13228E-13	0.00000	-.86429E-14	0.00000	-.11148E+00	0.00000	.25096E+00	0.00000
.95209E-01	0.00000	-.21939E-13	0.00000	.31523E-13	0.00000	.46257E-13	0.00000	-.11148E+00	0.00000	-.25096E+00	0.00000
.16346E-01	0.00000	-.89110E-14	0.00000	.14840E-13	0.00000	-.22192E-13	0.00000	.12104E-01	0.00000	-.28535E-01	0.00000
.16346E-01	0.00000	.21975E-13	0.00000	-.21957E-13	0.00000	.78014E-14	0.00000	.12104E-01	0.00000	.28535E-01	0.00000

NATURAL FREQUENCY= .165642E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.13586E-01	0.00000	-.41825E-13	0.00000	-.75258E-13	0.00000	-.44075E-14	0.00000	-.32178E-02	0.00000	-.12070E-01	0.00000
.13586E-01	0.00000	-.84341E-13	0.00000	.15012E-12	0.00000	.86486E-13	0.00000	-.32178E-02	0.00000	.12070E-01	0.00000
.48406E-01	0.00000	.22148E-12	0.00000	.24548E-13	0.00000	-.72634E-13	0.00000	.57720E-01	0.00000	.15572E+00	0.00000
.48406E-01	0.00000	.14329E-12	0.00000	-.47562E-13	0.00000	.29000E-12	0.00000	.57720E-01	0.00000	-.15572E+00	0.00000
.14031E+00	0.00000	-.17426E-12	0.00000	.61558E-14	0.00000	-.11659E-12	0.00000	-.11021E+00	0.00000	.13758E-01	0.00000
.14031E+00	0.00000	-.15690E-12	0.00000	-.28715E-13	0.00000	.12659E-13	0.00000	-.11021E+00	0.00000	-.13758E-01	0.00000
.36205E-01	0.00000	.64877E-14	0.00000	.75334E-13	0.00000	-.71635E-13	0.00000	.17147E-01	0.00000	-.31611E+00	0.00000
.36205E-01	0.00000	.87925E-13	0.00000	-.75706E-13	0.00000	-.78291E-13	0.00000	.17147E-01	0.00000	.31611E+00	0.00000
.17013E+00	0.00000	.54369E-13	0.00000	-.40697E-13	0.00000	-.64268E-13	0.00000	.14108E+00	0.00000	.20973E+00	0.00000
.17013E+00	0.00000	.11651E-12	0.00000	.49627E-13	0.00000	-.93413E-13	0.00000	.14108E+00	0.00000	-.20973E+00	0.00000
.17013E+00	0.00000	-.12118E-12	0.00000	.91635E-13	0.00000	-.42523E-13	0.00000	-.14108E+00	0.00000	.20973E+00	0.00000
.17013E+00	0.00000	-.96366E-13	0.00000	-.72067E-13	0.00000	-.90701E-13	0.00000	-.14108E+00	0.00000	-.20973E+00	0.00000
.36205E-01	0.00000	-.19617E-13	0.00000	-.17223E-13	0.00000	.19174E-13	0.00000	-.17147E-01	0.00000	-.31611E+00	0.00000
.36205E-01	0.00000	.23096E-13	0.00000	-.12050E-13	0.00000	-.20073E-12	0.00000	-.17147E-01	0.00000	.31611E+00	0.00000
.14031E+00	0.00000	.77241E-13	0.00000	.46308E-13	0.00000	.13078E-12	0.00000	.11021E+00	0.00000	.13758E-01	0.00000
.14031E+00	0.00000	.15108E-12	0.00000	-.74545E-13	0.00000	-.32843E-12	0.00000	.11021E+00	0.00000	-.13758E-01	0.00000
.49406E-01	0.00000	-.15211E-12	0.00000	-.18017E-12	0.00000	.16436E-13	0.00000	-.57720E-01	0.00000	.15572E+00	0.00000
.48406E-01	0.00000	-.13800E-12	0.00000	.21222E-12	0.00000	-.72264E-13	0.00000	-.57720E-01	0.00000	-.15572E+00	0.00000
.13586E-01	0.00000	.10204E-12	0.00000	.76466E-13	0.00000	-.86366E-13	0.00000	.32178E-02	0.00000	-.12070E-01	0.00000
.13586E-01	0.00000	.68673E-13	0.00000	-.57212E-13	0.00000	.10056E-12	0.00000	.32178E-02	0.00000	.12070E-01	0.00000

NATURAL FREQUENCY= .165645E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.34292E-01	0.00000	.14068E-13	0.00000	-.15217E-12	0.00000	-.10777E-12	0.00000	.24287E-01	0.00000	.30767E-01	0.00000
.34292E-01	0.00000	.17834E-13	0.00000	.63021E-13	0.00000	-.20778E-13	0.00000	.24287E-01	0.00000	-.30767E-01	0.00000
.58672E-01	0.00000	.13584E-13	0.00000	.88143E-13	0.00000	-.34043E-12	0.00000	-.30824E-01	0.00000	.86146E-01	0.00000
-.58672E-01	0.00000	.69729E-13	0.00000	-.11183E-12	0.00000	.98753E-13	0.00000	-.30824E-01	0.00000	-.86146E-01	0.00000
.48980E-01	0.00000	-.75638E-13	0.00000	.93565E-14	0.00000	-.75578E-14	0.00000	-.60815E-01	0.00000	-.24713E+00	0.00000
-.48980E-01	0.00000	.88602E-14	0.00000	-.57813E-14	0.00000	-.14517E-12	0.00000	-.60815E-01	0.00000	.24713E+00	0.00000
-.18432E+00	0.00000	-.17448E-13	0.00000	.41425E-13	0.00000	-.47826E-13	0.00000	.15633E+00	0.00000	.62230E-01	0.00000
.18432E+00	0.00000	.14325E-13	0.00000	-.17161E-14	0.00000	.44039E-13	0.00000	.15633E+00	0.00000	-.62230E-01	0.00000
.11096E+00	0.00000	.47243E-13	0.00000	.36871E-13	0.00000	.20074E-12	0.00000	-.88976E-01	0.00000	.30082E+00	0.00000
-.11096E+00	0.00000	.13933E-14	0.00000	.27697E-13	0.00000	.84633E-13	0.00000	-.88976E-01	0.00000	-.30082E+00	0.00000
.11095E+00	0.00000	.12698E-13	0.00000	.32848E-13	0.00000	.22861E-12	0.00000	-.88976E-01	0.00000	-.30082E+00	0.00000
-.11096E+00	0.00000	-.99651E-13	0.00000	.14704E-13	0.00000	.24348E-12	0.00000	-.88976E-01	0.00000	.30082E+00	0.00000
-.18432E+00	0.00000	.85561E-13	0.00000	.32719E-13	0.00000	.35607E-12	0.00000	.15633E+00	0.00000	-.62230E-01	0.00000
.18432E+00	0.00000	-.29746E-13	0.00000	-.22597E-13	0.00000	.14073E-12	0.00000	.15633E+00	0.00000	.62230E-01	0.00000
.48980E-01	0.00000	.48700E-13	0.00000	-.69943E-13	0.00000	.24107E-12	0.00000	-.60815E-01	0.00000	.24713E+00	0.00000
-.48980E-01	0.00000	-.41569E-13	0.00000	.18950E-13	0.00000	.18221E-12	0.00000	-.60815E-01	0.00000	-.24713E+00	0.00000
.58672E-01	0.00000	.11836E-13	0.00000	-.20915E-13	0.00000	.10006E-12	0.00000	-.30824E-01	0.00000	-.86146E-01	0.00000
-.58672E-01	0.00000	-.40692E-13	0.00000	-.46039E-13	0.00000	.47266E-13	0.00000	-.30824E-01	0.00000	.86146E-01	0.00000
-.34292E-01	0.00000	-.38233E-13	0.00000	-.22474E-13	0.00000	-.15129E-13	0.00000	.24287E-01	0.00000	-.30767E-01	0.00000
.34292E-01	0.00000	.53410E-13	0.00000	.17319E-13	0.00000	-.35628E-13	0.00000	.24287E-01	0.00000	.30767E-01	0.00000

NATURAL FREQUENCY= .166276E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.15626E-13	0.00000	-.14356E+00	0.00000	-.12627E-10	0.00000	-.47969E-11	0.00000	.25619E-13	0.00000	.43639E-14	0.00000
.16361E-13	0.00000	-.14356E+00	0.00000	.12534E-10	0.00000	.44925E-11	0.00000	-.20667E-13	0.00000	-.44038E-13	0.00000
.10456E-13	0.00000	.31233E+00	0.00000	-.11896E-11	0.00000	-.29114E-10	0.00000	-.12971E-13	0.00000	-.14128E-12	0.00000
-.36372E-13	0.00000	.31233E+00	0.00000	.11671E-11	0.00000	.28528E-10	0.00000	-.60293E-13	0.00000	.12019E-12	0.00000
-.14417E-12	0.00000	-.22361E+00	0.00000	-.14946E-11	0.00000	-.20742E-10	0.00000	.14439E-12	0.00000	.15066E-12	0.00000
.15966E-12	0.00000	-.22361E+00	0.00000	.14767E-11	0.00000	.20385E-10	0.00000	.13899E-12	0.00000	-.12098E-12	0.00000
.16172E-12	0.00000	-.49469E-01	0.00000	.70693E-11	0.00000	-.25649E-10	0.00000	-.12438E-12	0.00000	.73672E-13	0.00000
-.15125E-12	0.00000	-.49469E-01	0.00000	-.70935E-11	0.00000	.24987E-10	0.00000	-.20586E-12	0.00000	-.63613E-13	0.00000
-.70616E-13	0.00000	.28176E+00	0.00000	.82675E-11	0.00000	-.30607E-11	0.00000	.94827E-13	0.00000	-.10025E-12	0.00000
.10629E-12	0.00000	.28176E+00	0.00000	-.82406E-11	0.00000	.23360E-11	0.00000	.36840E-13	0.00000	.10124E-12	0.00000
-.14953E-13	0.00000	-.28176E+00	0.00000	.84157E-11	0.00000	.27122E-11	0.00000	.81274E-14	0.00000	.17724E-12	0.00000
.13896E-13	0.00000	-.28176E+00	0.00000	-.83469E-11	0.00000	-.32385E-11	0.00000	-.33294E-13	0.00000	-.21569E-12	0.00000
.39900E-13	0.00000	.49469E-01	0.00000	.69924E-11	0.00000	.25408E-10	0.00000	.20174E-13	0.00000	.31341E-13	0.00000
-.62595E-13	0.00000	.49469E-01	0.00000	-.69529E-11	0.00000	-.25877E-10	0.00000	-.22326E-13	0.00000	.46749E-13	0.00000
.32046E-13	0.00000	.22361E+00	0.00000	-.14296E-11	0.00000	.20778E-10	0.00000	-.31591E-13	0.00000	-.11612E-12	0.00000
-.11604E-14	0.00000	.22361E+00	0.00000	.14314E-11	0.00000	-.20870E-10	0.00000	-.85037E-13	0.00000	.13290E-12	0.00000
-.10896E-12	0.00000	-.31233E+00	0.00000	-.13149E-11	0.00000	.29100E-10	0.00000	.12892E-12	0.00000	.26333E-14	0.00000
.10956E-12	0.00000	-.31233E+00	0.00000	.13880E-11	0.00000	-.29017E-10	0.00000	.10747E-12	0.00000	-.97410E-14	0.00000
.71615E-13	0.00000	.14356E+00	0.00000	-.12610E-10	0.00000	.46424E-11	0.00000	-.36568E-13	0.00000	.43751E-13	0.00000
-.62352E-13	0.00000	.14356E+00	0.00000	.12574E-10	0.00000	-.45797E-11	0.00000	-.67398E-13	0.00000	-.47721E-13	0.00000

NATURAL FREQUENCY= .166343E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.10796E-13	0.00000	-.13504E-10	0.00000	.13372E+00	0.00000	.49414E-01	0.00000	.54309E-13	0.00000	.22841E-13	0.00000
.13036E-13	0.00000	-.13416E-10	0.00000	-.13372E+00	0.00000	-.49414E-01	0.00000	-.30359E-13	0.00000	-.19203E-13	0.00000
.42566E-13	0.00000	.29304E-10	0.00000	.13180E-01	0.00000	.30678E+00	0.00000	-.32997E-13	0.00000	.25880E-13	0.00000
-.49953E-13	0.00000	.29212E-10	0.00000	-.13180E-01	0.00000	-.30678E+00	0.00000	-.86334E-14	0.00000	-.12630E-13	0.00000
.37189E-13	0.00000	-.20947E-10	0.00000	.15803E-01	0.00000	.21957E+00	0.00000	-.15837E-13	0.00000	-.63267E-13	0.00000
-.22042E-13	0.00000	-.20896E-10	0.00000	-.15803E-01	0.00000	-.21957E+00	0.00000	-.40803E-13	0.00000	.23264E-13	0.00000
.54993E-13	0.00000	-.46476E-11	0.00000	-.74560E-01	0.00000	.27013E+00	0.00000	-.28318E-14	0.00000	-.10408E-12	0.00000
-.22131E-13	0.00000	-.46375E-11	0.00000	.74560E-01	0.00000	-.27013E+00	0.00000	-.64618E-13	0.00000	.68987E-13	0.00000
-.92837E-13	0.00000	.26435E-10	0.00000	-.88145E-01	0.00000	.30530E-01	0.00000	.24718E-13	0.00000	-.29047E-13	0.00000
.28694E-13	0.00000	.26369E-10	0.00000	.88145E-01	0.00000	-.30530E-01	0.00000	.48483E-13	0.00000	.22548E-13	0.00000
.14179E-13	0.00000	-.26389E-10	0.00000	-.88145E-01	0.00000	-.30530E-01	0.00000	-.40944E-15	0.00000	.17840E-12	0.00000
.28824E-13	0.00000	-.26390E-10	0.00000	.88145E-01	0.00000	.30530E-01	0.00000	-.25993E-14	0.00000	-.10636E-12	0.00000
-.28634E-14	0.00000	.46521E-11	0.00000	-.74560E-01	0.00000	-.27013E+00	0.00000	.36569E-13	0.00000	-.11942E-13	0.00000
.79829E-14	0.00000	.46172E-11	0.00000	.74560E-01	0.00000	.27013E+00	0.00000	-.26518E-13	0.00000	-.72532E-13	0.00000
-.48192E-13	0.00000	.20970E-10	0.00000	.15803E-01	0.00000	-.21957E+00	0.00000	.83397E-13	0.00000	.14435E-12	0.00000
.22473E-13	0.00000	.20940E-10	0.00000	-.15803E-01	0.00000	.21957E+00	0.00000	.34050E-13	0.00000	-.18488E-12	0.00000
.97444E-13	0.00000	-.29260E-10	0.00000	.13180E-01	0.00000	-.30678E+00	0.00000	-.65470E-13	0.00000	.58400E-13	0.00000
-.96316E-13	0.00000	-.27289E-10	0.00000	-.13180E-01	0.00000	.30678E+00	0.00000	-.10010E-12	0.00000	-.42099E-14	0.00000
-.13767E-13	0.00000	.13493E-10	0.00000	.13372E+00	0.00000	-.49414E-01	0.00000	.47242E-13	0.00000	-.26309E-13	0.00000
.14193E-13	0.00000	.13386E-10	0.00000	-.13372E+00	0.00000	.49414E-01	0.00000	.18651E-13	0.00000	.92299E-13	0.00000

NATURAL FREQUENCY= .168689E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.56752E-13	0.00000	.33417E-01	0.00000	.10380E-02	0.00000	.37198E-01	0.00000	.27183E-13	0.00000	.13157E-13	0.00000
.14709E-13	0.00000	-.33417E-01	0.00000	.10380E-02	0.00000	.37198E-01	0.00000	-.13383E-13	0.00000	.12790E-13	0.00000
.32083E-13	0.00000	-.29133E-01	0.00000	-.27800E-01	0.00000	-.55769E-01	0.00000	.15265E-13	0.00000	.28774E-12	0.00000
-.15423E-13	0.00000	.29133E-01	0.00000	-.27800E-01	0.00000	-.55769E-01	0.00000	.33684E-13	0.00000	-.17785E-12	0.00000
.69728E-13	0.00000	-.52577E-01	0.00000	-.23631E-01	0.00000	-.20475E+00	0.00000	-.10171E-12	0.00000	-.19951E-12	0.00000
-.65022E-13	0.00000	.52577E-01	0.00000	-.23631E-01	0.00000	-.20475E+00	0.00000	-.76101E-13	0.00000	.17544E-12	0.00000
-.12125E-12	0.00000	-.74249E-01	0.00000	-.12017E-01	0.00000	-.28205E+00	0.00000	.13789E-12	0.00000	.93278E-15	0.00000
.98475E-13	0.00000	.74249E-01	0.00000	-.12017E-01	0.00000	-.28205E+00	0.00000	.98357E-13	0.00000	-.71819E-14	0.00000
.83481E-13	0.00000	-.88729E-01	0.00000	-.49463E-02	0.00000	-.32815E+00	0.00000	-.10644E-12	0.00000	.10052E-12	0.00000
-.76924E-13	0.00000	.88729E-01	0.00000	-.49463E-02	0.00000	-.32815E+00	0.00000	-.74601E-13	0.00000	-.12230E-12	0.00000
.35479E-14	0.00000	-.88729E-01	0.00000	.49463E-02	0.00000	-.32815E+00	0.00000	-.47654E-15	0.00000	-.19446E-12	0.00000
.12198E-13	0.00000	.88729E-01	0.00000	.49463E-02	0.00000	-.32815E+00	0.00000	.31535E-13	0.00000	.12545E-12	0.00000
-.84086E-13	0.00000	-.74249E-01	0.00000	.12017E-01	0.00000	-.28205E+00	0.00000	.98313E-13	0.00000	.10690E-12	0.00000
.60661E-13	0.00000	.74249E-01	0.00000	.12017E-01	0.00000	-.28205E+00	0.00000	.86989E-13	0.00000	-.14722E-12	0.00000
.89415E-13	0.00000	-.52577E-01	0.00000	.23631E-01	0.00000	-.20475E+00	0.00000	-.90765E-13	0.00000	-.36844E-13	0.00000
-.79637E-13	0.00000	.52577E-01	0.00000	.23631E-01	0.00000	-.20475E+00	0.00000	-.10244E-12	0.00000	.36678E-13	0.00000
-.59528E-13	0.00000	-.29133E-01	0.00000	.27800E-01	0.00000	-.55769E-01	0.00000	.81037E-13	0.00000	.16215E-14	0.00000
.53874E-13	0.00000	.29133E-01	0.00000	.27800E-01	0.00000	-.55769E-01	0.00000	.76121E-13	0.00000	-.19342E-13	0.00000
.38492E-13	0.00000	.33417E-01	0.00000	-.10380E-02	0.00000	.37198E-01	0.00000	-.18739E-13	0.00000	.51761E-13	0.00000
-.34285E-13	0.00000	-.33417E-01	0.00000	-.10380E-02	0.00000	.37198E-01	0.00000	-.29515E-13	0.00000	-.37979E-13	0.00000

NATURAL FREQUENCY= .169000E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.60789E-14	0.00000	.15897E-12	0.00000	-.19524E+00	0.00000	-.14741E+00	0.00000	.99613E-14	0.00000	.41912E-13	0.00000
.66994E-14	0.00000	-.17157E-12	0.00000	.19524E+00	0.00000	.14741E+00	0.00000	.23586E-13	0.00000	-.17583E-13	0.00000
.51043E-13	0.00000	-.16073E-12	0.00000	.18885E+00	0.00000	-.22515E+00	0.00000	-.51466E-13	0.00000	-.10059E-12	0.00000
-.28564E-13	0.00000	.16309E-12	0.00000	-.18885E+00	0.00000	.22515E+00	0.00000	-.67719E-13	0.00000	.55211E-13	0.00000
-.60113E-13	0.00000	-.23160E-12	0.00000	-.62105E-01	0.00000	-.50557E-01	0.00000	.85391E-13	0.00000	.77403E-13	0.00000
.97178E-13	0.00000	.25076E-12	0.00000	.62105E-01	0.00000	.50557E-01	0.00000	.86286E-13	0.00000	-.34864E-13	0.00000
.10302E-12	0.00000	-.22301E-12	0.00000	.21974E+00	0.00000	.66964E-01	0.00000	-.55472E-13	0.00000	.30117E-13	0.00000
-.92824E-13	0.00000	.30878E-12	0.00000	-.21974E+00	0.00000	-.66964E-01	0.00000	-.56528E-13	0.00000	-.14318E-12	0.00000
-.29333E-13	0.00000	-.20876E-12	0.00000	-.10246E+00	0.00000	.19700E+00	0.00000	.37669E-13	0.00000	-.22864E-12	0.00000
-.39884E-14	0.00000	.19990E-12	0.00000	.10246E+00	0.00000	-.19700E+00	0.00000	.13921E-13	0.00000	.20691E-12	0.00000
-.55409E-13	0.00000	-.86558E-13	0.00000	.10246E+00	0.00000	.19700E+00	0.00000	.35412E-13	0.00000	.76449E-13	0.00000
.22491E-13	0.00000	.94138E-13	0.00000	-.10246E+00	0.00000	-.19700E+00	0.00000	.25257E-13	0.00000	.14223E-12	0.00000
.57962E-13	0.00000	-.44297E-13	0.00000	-.21974E+00	0.00000	.66764E-01	0.00000	.17462E-14	0.00000	.41941E-13	0.00000
.50186E-13	0.00000	.27989E-13	0.00000	.21974E+00	0.00000	-.66964E-01	0.00000	-.12055E-14	0.00000	-.63456E-13	0.00000
-.45829E-13	0.00000	-.12231E-13	0.00000	.62105E-01	0.00000	-.50557E-01	0.00000	.30080E-13	0.00000	-.11036E-12	0.00000
-.22533E-13	0.00000	-.38546E-13	0.00000	-.62105E-01	0.00000	.50557E-01	0.00000	.28357E-13	0.00000	-.31292E-13	0.00000
-.26178E-14	0.00000	.22364E-13	0.00000	-.18885E+00	0.00000	-.22515E+00	0.00000	-.50099E-13	0.00000	.12560E-12	0.00000
-.42478E-13	0.00000	.51396E-14	0.00000	.18885E+00	0.00000	.22515E+00	0.00000	-.48891E-13	0.00000	.12186E-12	0.00000
.29290E-14	0.00000	-.25372E-13	0.00000	.19524E+00	0.00000	-.14741E+00	0.00000	.35410E-13	0.00000	-.74082E-14	0.00000
.32720E-13	0.00000	.25793E-13	0.00000	-.19524E+00	0.00000	.14741E+00	0.00000	.34026E-13	0.00000	-.41756E-13	0.00000

NATURAL FREQUENCY= .171349E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.12605E-13	0.00000	-.54653E-01	0.00000	.29958E-02	0.00000	-.53974E-01	0.00000	.31688E-13	0.00000	.50671E-13	0.00000
.49900E-13	0.00000	.54653E-01	0.00000	.29958E-02	0.00000	-.53974E-01	0.00000	.37151E-13	0.00000	-.68558E-13	0.00000
.76792E-13	0.00000	.57858E-01	0.00000	.43436E-01	0.00000	.12499E+00	0.00000	-.73966E-13	0.00000	-.95007E-13	0.00000
-.77193E-13	0.00000	-.57858E-01	0.00000	.43436E-01	0.00000	.12499E+00	0.00000	-.87969E-13	0.00000	-.20555E-13	0.00000
-.33045E-13	0.00000	.96099E-01	0.00000	.18150E-01	0.00000	.32355E+00	0.00000	.15748E-13	0.00000	-.14997E-12	0.00000
-.12647E-14	0.00000	-.96099E-01	0.00000	.18150E-01	0.00000	.32355E+00	0.00000	.14468E-14	0.00000	.16833E-12	0.00000
-.10102E-12	0.00000	.87622E-01	0.00000	-.22280E-01	0.00000	.29506E+00	0.00000	.83193E-13	0.00000	.73237E-13	0.00000
.11717E-12	0.00000	-.87622E-01	0.00000	-.22280E-01	0.00000	.29506E+00	0.00000	.12687E-12	0.00000	-.14327E-12	0.00000
.80708E-13	0.00000	.36580E-01	0.00000	-.42302E-01	0.00000	.11660E+00	0.00000	-.55550E-13	0.00000	.13694E-12	0.00000
-.10034E-12	0.00000	-.36580E-01	0.00000	-.42302E-01	0.00000	.11660E+00	0.00000	-.64282E-13	0.00000	-.12381E-12	0.00000
.34988E-13	0.00000	-.36580E-01	0.00000	-.42302E-01	0.00000	-.11660E+00	0.00000	-.36382E-13	0.00000	-.15684E-12	0.00000
-.50596E-13	0.00000	.36580E-01	0.00000	-.42302E-01	0.00000	-.11660E+00	0.00000	-.47973E-13	0.00000	.22675E-12	0.00000
-.63677E-13	0.00000	-.87622E-01	0.00000	-.22280E-01	0.00000	-.29506E+00	0.00000	.67958E-13	0.00000	.20953E-13	0.00000
.62193E-13	0.00000	.87622E-01	0.00000	-.22280E-01	0.00000	-.29506E+00	0.00000	.68252E-13	0.00000	-.61535E-14	0.00000
.20371E-13	0.00000	-.96099E-01	0.00000	.18150E-01	0.00000	-.32355E+00	0.00000	-.42480E-13	0.00000	.46215E-13	0.00000
-.29027E-13	0.00000	.96099E-01	0.00000	.18150E-01	0.00000	-.32355E+00	0.00000	-.29533E-13	0.00000	-.55771E-13	0.00000
.79006E-14	0.00000	-.57858E-01	0.00000	.43436E-01	0.00000	-.12499E+00	0.00000	-.40807E-14	0.00000	.21640E-14	0.00000
-.31223E-13	0.00000	.57858E-01	0.00000	.43436E-01	0.00000	-.12499E+00	0.00000	.22230E-14	0.00000	.47797E-13	0.00000
.58115E-14	0.00000	.54653E-01	0.00000	.29958E-02	0.00000	.53974E-01	0.00000	-.20899E-13	0.00000	.19780E-13	0.00000
.21539E-14	0.00000	-.54653E-01	0.00000	.29958E-02	0.00000	.53974E-01	0.00000	-.93305E-14	0.00000	-.21351E-13	0.00000

NATURAL FREQUENCY= .172097E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.30564E-13	0.00000	-.13789E-14	0.00000	.30928E-01	0.00000	-.40542E-01	0.00000	.24328E-13	0.00000	.72502E-14	0.00000
-.11412E-13	0.00000	.60453E-13	0.00000	-.30928E-01	0.00000	.40542E-01	0.00000	-.21279E-13	0.00000	.11097E-13	0.00000
-.10653E-13	0.00000	-.56328E-13	0.00000	.14346E+00	0.00000	.28427E+00	0.00000	-.22809E-13	0.00000	.41307E-13	0.00000
.99102E-14	0.00000	-.16064E-12	0.00000	-.14346E+00	0.00000	-.28427E+00	0.00000	-.60984E-15	0.00000	.23702E-13	0.00000
-.11295E-13	0.00000	.79705E-13	0.00000	-.20502E+00	0.00000	.10700E+00	0.00000	.45969E-13	0.00000	.35503E-13	0.00000
.20172E-13	0.00000	.83275E-13	0.00000	.20502E+00	0.00000	-.10700E+00	0.00000	.29503E-13	0.00000	-.81655E-13	0.00000
-.34154E-14	0.00000	-.60628E-13	0.00000	.52218E-01	0.00000	.20311E-01	0.00000	-.32819E-13	0.00000	.23486E-13	0.00000
-.15396E-13	0.00000	.47166E-13	0.00000	-.52218E-01	0.00000	-.20311E-01	0.00000	-.13859E-13	0.00000	.20457E-13	0.00000
-.18677E-13	0.00000	-.16449E-12	0.00000	-.22101E+00	0.00000	-.20195E+00	0.00000	.65002E-13	0.00000	.87218E-13	0.00000
.57323E-13	0.00000	.24279E-15	0.00000	.22101E+00	0.00000	.20195E+00	0.00000	.26222E-13	0.00000	-.66661E-13	0.00000
-.31202E-13	0.00000	.24887E-13	0.00000	.22101E+00	0.00000	-.20195E+00	0.00000	-.88661E-13	0.00000	-.70417E-13	0.00000
-.49997E-13	0.00000	.99346E-13	0.00000	-.22101E+00	0.00000	.20195E+00	0.00000	-.87054E-13	0.00000	.18792E-13	0.00000
-.12415E-12	0.00000	.45765E-13	0.00000	-.52218E-01	0.00000	.20311E-01	0.00000	.14511E-12	0.00000	.11252E-12	0.00000
.98891E-13	0.00000	-.11108E-12	0.00000	.52218E-01	0.00000	-.20311E-01	0.00000	.13920E-12	0.00000	-.44808E-13	0.00000
.12765E-12	0.00000	.12993E-12	0.00000	.20502E+00	0.00000	.10700E+00	0.00000	-.13465E-12	0.00000	.94930E-13	0.00000
-.10891E-12	0.00000	-.17293E-12	0.00000	-.20502E+00	0.00000	-.10700E+00	0.00000	-.13211E-12	0.00000	.15786E-14	0.00000
-.20424E-13	0.00000	.15156E-12	0.00000	-.14346E+00	0.00000	.28427E+00	0.00000	.93646E-13	0.00000	-.16897E-12	0.00000
.10749E-12	0.00000	-.48640E-13	0.00000	.14346E+00	0.00000	-.28427E+00	0.00000	.89326E-13	0.00000	.13053E-12	0.00000
.30775E-14	0.00000	-.11218E-12	0.00000	-.30928E-01	0.00000	-.40542E-01	0.00000	-.31720E-13	0.00000	.53463E-13	0.00000
-.45322E-13	0.00000	.76390E-13	0.00000	.30928E-01	0.00000	.40542E-01	0.00000	-.33402E-13	0.00000	-.56983E-13	0.00000

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.31373E-13	0.00000	.56487E-13	0.00000	-.16574E+00	0.00000	-.14532E+00	0.00000	-.11962E-13	0.00000	-.32241E-13	0.00000
-.36531E-13	0.00000	-.84666E-13	0.00000	.16574E+00	0.00000	.14532E+00	0.00000	-.32762E-13	0.00000	.33360E-13	0.00000
-.35563E-13	0.00000	-.73227E-13	0.00000	.25017E+00	0.00000	-.14595E+00	0.00000	.24700E-13	0.00000	-.50775E-13	0.00000
.22849E-13	0.00000	.19121E-12	0.00000	-.25017E+00	0.00000	.14595E+00	0.00000	.34785E-13	0.00000	.95359E-14	0.00000
.23158E-13	0.00000	-.19345E-12	0.00000	-.43067E-01	0.00000	.21295E+00	0.00000	-.21642E-13	0.00000	.62479E-13	0.00000
.15792E-13	0.00000	.75037E-13	0.00000	.43067E-01	0.00000	-.21295E+00	0.00000	-.36122E-13	0.00000	-.36660E-14	0.00000
.45619E-13	0.00000	.73033E-13	0.00000	.70914E-01	0.00000	.77507E-01	0.00000	-.11003E-13	0.00000	-.58346E-13	0.00000
.13232E-13	0.00000	.52871E-13	0.00000	-.70914E-01	0.00000	-.77507E-01	0.00000	-.12459E-14	0.00000	-.55426E-13	0.00000
.83733E-13	0.00000	.13330E-12	0.00000	-.11227E+00	0.00000	.21836E+00	0.00000	.30454E-13	0.00000	-.81514E-13	0.00000
.10022E-13	0.00000	-.11909E-12	0.00000	.11227E+00	0.00000	-.21836E+00	0.00000	.57407E-13	0.00000	.29684E-13	0.00000
.38733E-13	0.00000	.10070E-12	0.00000	-.11227E+00	0.00000	-.21836E+00	0.00000	-.14466E-13	0.00000	.16582E-12	0.00000
.12461E-13	0.00000	-.12250E-12	0.00000	.11227E+00	0.00000	.21836E+00	0.00000	-.12067E-13	0.00000	.71898E-13	0.00000
.10814E-12	0.00000	.19028E-13	0.00000	.70914E-01	0.00000	-.77507E-01	0.00000	-.86969E-13	0.00000	-.25302E-12	0.00000
.60959E-13	0.00000	.68271E-13	0.00000	-.70914E-01	0.00000	.77507E-01	0.00000	-.87083E-13	0.00000	.11103E-12	0.00000
.15958E-12	0.00000	-.19776E-12	0.00000	-.43067E-01	0.00000	-.21295E+00	0.00000	.14539E-12	0.00000	-.27035E-12	0.00000
.11695E-12	0.00000	.10552E-12	0.00000	.43067E-01	0.00000	.21295E+00	0.00000	.14735E-12	0.00000	.12153E-12	0.00000
.26233E-13	0.00000	-.62218E-13	0.00000	.25017E+00	0.00000	.14595E+00	0.00000	-.70341E-13	0.00000	.19788E-12	0.00000
.32643E-13	0.00000	.16673E-12	0.00000	-.25017E+00	0.00000	-.14595E+00	0.00000	-.70700E-13	0.00000	-.12535E-12	0.00000
.19915E-13	0.00000	.83050E-13	0.00000	-.16574E+00	0.00000	.14532E+00	0.00000	.22192E-13	0.00000	-.17300E-13	0.00000
.63250E-14	0.00000	-.10629E-12	0.00000	.16574E+00	0.00000	-.14532E+00	0.00000	.20538E-13	0.00000	.16813E-13	0.00000

NATURAL FREQUENCY= .175117E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.73636E-14	0.00000	-.69081E-01	0.00000	.94699E-02	0.00000	-.55798E-01	0.00000	-.10237E-13	0.00000	.52647E-15	0.00000
.35941E-14	0.00000	.69081E-01	0.00000	.94699E-02	0.00000	-.55798E-01	0.00000	-.20422E-13	0.00000	.16420E-13	0.00000
-.14590E-13	0.00000	.91704E-01	0.00000	.42468E-01	0.00000	.18973E+00	0.00000	.15542E-13	0.00000	.41786E-13	0.00000
.33879E-13	0.00000	-.91704E-01	0.00000	.42468E-01	0.00000	.18973E+00	0.00000	.60359E-14	0.00000	-.33240E-13	0.00000
.24396E-13	0.00000	.11549E+00	0.00000	-.15792E-01	0.00000	.30559E+00	0.00000	-.10349E-13	0.00000	.64439E-14	0.00000
-.39978E-13	0.00000	-.11549E+00	0.00000	-.15792E-01	0.00000	.30559E+00	0.00000	-.84052E-14	0.00000	.28510E-13	0.00000
-.44553E-13	0.00000	.10792E-01	0.00000	-.61098E-01	0.00000	.34367E-01	0.00000	-.30006E-14	0.00000	.51891E-13	0.00000
.36375E-13	0.00000	-.10792E-01	0.00000	-.61098E-01	0.00000	.34367E-01	0.00000	.32446E-13	0.00000	.23338E-13	0.00000
.66134E-13	0.00000	-.10207E+00	0.00000	-.31912E-01	0.00000	-.27113E+00	0.00000	-.32274E-13	0.00000	.10410E-12	0.00000
-.28594E-13	0.00000	.10207E+00	0.00000	-.31912E-01	0.00000	-.27113E+00	0.00000	-.38355E-13	0.00000	-.28269E-15	0.00000
.70064E-14	0.00000	-.10207E+00	0.00000	.31912E-01	0.00000	-.27113E+00	0.00000	-.30469E-13	0.00000	-.54249E-13	0.00000
-.15986E-13	0.00000	.10207E+00	0.00000	.31912E-01	0.00000	-.27113E+00	0.00000	-.21993E-13	0.00000	.16710E-12	0.00000
-.52828E-13	0.00000	.10792E-01	0.00000	.61098E-01	0.00000	.34367E-01	0.00000	.88137E-13	0.00000	.93536E-13	0.00000
.46250E-13	0.00000	-.10792E-01	0.00000	.61098E-01	0.00000	.34367E-01	0.00000	.86851E-13	0.00000	-.89635E-13	0.00000
.29013E-13	0.00000	.11549E+00	0.00000	.15792E-01	0.00000	.30559E+00	0.00000	-.55070E-13	0.00000	.10150E-12	0.00000
-.33790E-13	0.00000	-.11549E+00	0.00000	.15792E-01	0.00000	.30559E+00	0.00000	-.57721E-13	0.00000	-.72185E-13	0.00000
-.24895E-13	0.00000	.91704E-01	0.00000	-.42468E-01	0.00000	.18973E+00	0.00000	.25871E-13	0.00000	.18465E-13	0.00000
-.25163E-14	0.00000	-.91704E-01	0.00000	-.42468E-01	0.00000	.18973E+00	0.00000	.24469E-13	0.00000	.88847E-13	0.00000
.17486E-13	0.00000	-.69081E-01	0.00000	-.94699E-02	0.00000	-.55798E-01	0.00000	-.31402E-13	0.00000	-.12002E-13	0.00000
.19271E-14	0.00000	.69081E-01	0.00000	-.94699E-02	0.00000	-.55798E-01	0.00000	-.32618E-13	0.00000	-.27226E-13	0.00000

NATURAL FREQUENCY= .175972E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.11392E-13	0.00000	-.42150E-12	0.00000	.34483E-01	0.00000	-.25426E-01	0.00000	.19759E-13	0.00000	.11550E-13	0.00000
.35113E-13	0.00000	.26979E-12	0.00000	-.34483E-01	0.00000	.25426E-01	0.00000	-.20470E-13	0.00000	.11444E-13	0.00000
-.96202E-14	0.00000	.78726E-12	0.00000	.11225E+00	0.00000	.26563E+00	0.00000	.12948E-13	0.00000	.55468E-13	0.00000
.15899E-13	0.00000	-.84146E-13	0.00000	-.11225E+00	0.00000	-.26563E+00	0.00000	.26541E-13	0.00000	-.81634E-13	0.00000
.41124E-13	0.00000	.13378E-12	0.00000	-.26865E+00	0.00000	.44686E-01	0.00000	-.33347E-13	0.00000	.20386E-13	0.00000
-.62279E-13	0.00000	-.88780E-12	0.00000	.26865E+00	0.00000	-.44686E-01	0.00000	-.39715E-13	0.00000	-.48319E-13	0.00000
-.33582E-14	0.00000	.31517E-12	0.00000	.61483E-01	0.00000	-.28890E+00	0.00000	.15775E-13	0.00000	-.40430E-13	0.00000
.50976E-13	0.00000	.25192E-12	0.00000	-.61483E-01	0.00000	.28890E+00	0.00000	.38196E-13	0.00000	.77008E-13	0.00000
.53520E-14	0.00000	-.61015E-12	0.00000	.60439E-01	0.00000	.31420E-02	0.00000	.98426E-15	0.00000	.29095E-14	0.00000
.19903E-13	0.00000	.35257E-12	0.00000	-.60439E-01	0.00000	-.31420E-02	0.00000	.22809E-14	0.00000	-.64380E-13	0.00000
-.32293E-13	0.00000	-.61412E-12	0.00000	.60439E-01	0.00000	-.31420E-02	0.00000	-.23745E-13	0.00000	-.31036E-13	0.00000
-.86229E-14	0.00000	.29528E-12	0.00000	-.60439E-01	0.00000	.31420E-02	0.00000	-.28139E-13	0.00000	-.49314E-13	0.00000
-.18350E-13	0.00000	.36443E-12	0.00000	.61483E-01	0.00000	.28890E+00	0.00000	.53752E-13	0.00000	.35367E-13	0.00000
.22140E-13	0.00000	.22925E-12	0.00000	-.61483E-01	0.00000	-.28890E+00	0.00000	.50461E-13	0.00000	-.57716E-13	0.00000
.23928E-13	0.00000	.18515E-12	0.00000	-.26865E+00	0.00000	-.44686E-01	0.00000	-.22450E-13	0.00000	.10990E-12	0.00000
-.32629E-13	0.00000	-.94185E-12	0.00000	.26865E+00	0.00000	.44686E-01	0.00000	-.25685E-13	0.00000	-.97652E-13	0.00000
.88550E-15	0.00000	.76857E-12	0.00000	.11225E+00	0.00000	-.26563E+00	0.00000	.12871E-13	0.00000	.42052E-13	0.00000
.36124E-13	0.00000	-.15497E-12	0.00000	-.11225E+00	0.00000	.26563E+00	0.00000	.11869E-13	0.00000	-.54143E-13	0.00000
.18925E-13	0.00000	-.44465E-12	0.00000	.34483E-01	0.00000	.25426E-01	0.00000	-.26435E-14	0.00000	-.15260E-13	0.00000
-.55470E-13	0.00000	.23673E-12	0.00000	-.34483E-01	0.00000	-.25426E-01	0.00000	.16004E-14	0.00000	.15834E-13	0.00000

NATURAL FREQUENCY= .176159E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.46558E-14	0.00000	.36502E-12	0.00000	.10764E+00	0.00000	.91955E-01	0.00000	.22277E-13	0.00000	.10738E-13	0.00000
.20795E-13	0.00000	.21545E-12	0.00000	-.10764E+00	0.00000	-.91955E-01	0.00000	.23268E-13	0.00000	.10780E-13	0.00000
-.49971E-13	0.00000	-.82643E-12	0.00000	-.18444E+00	0.00000	.12552E+00	0.00000	.21082E-13	0.00000	.43644E-13	0.00000
.40519E-13	0.00000	-.69855E-12	0.00000	.18444E+00	0.00000	-.12552E+00	0.00000	.22088E-13	0.00000	-.75136E-13	0.00000
.18224E-13	0.00000	.83413E-12	0.00000	-.35278E-01	0.00000	-.33989E+00	0.00000	-.10679E-12	0.00000	.70377E-13	0.00000
-.76146E-13	0.00000	.10823E-11	0.00000	.35278E-01	0.00000	.33989E+00	0.00000	-.80619E-13	0.00000	-.22912E-13	0.00000
-.23579E-13	0.00000	-.80142E-12	0.00000	.20687E+00	0.00000	.51508E-01	0.00000	.51887E-13	0.00000	-.10420E-13	0.00000
.32126E-13	0.00000	-.75970E-12	0.00000	-.20667E+00	0.00000	-.51508E-01	0.00000	.45339E-13	0.00000	.15399E-12	0.00000
.31270E-13	0.00000	.38654E-12	0.00000	-.92705E-01	0.00000	.97651E-01	0.00000	-.12171E-13	0.00000	.89763E-13	0.00000
-.37056E-13	0.00000	.16080E-12	0.00000	.92705E-01	0.00000	-.97651E-01	0.00000	-.57451E-14	0.00000	-.15497E-12	0.00000
.22720E-13	0.00000	.41350E-12	0.00000	.92705E-01	0.00000	.97651E-01	0.00000	-.57014E-13	0.00000	-.11655E-12	0.00000
-.83705E-13	0.00000	.19275E-12	0.00000	-.92705E-01	0.00000	-.97651E-01	0.00000	-.63358E-13	0.00000	.54727E-13	0.00000
-.11024E-12	0.00000	-.83239E-12	0.00000	-.20667E+00	0.00000	.51508E-01	0.00000	.89762E-13	0.00000	.21816E-13	0.00000
.66303E-13	0.00000	-.75665E-12	0.00000	.20687E+00	0.00000	-.51508E-01	0.00000	.84359E-13	0.00000	.65972E-13	0.00000
.75894E-13	0.00000	.85586E-12	0.00000	.35278E-01	0.00000	-.33989E+00	0.00000	-.72719E-13	0.00000	.14797E-12	0.00000
-.16204E-13	0.00000	.11128E-11	0.00000	-.35278E-01	0.00000	.33989E+00	0.00000	-.79409E-13	0.00000	-.12307E-12	0.00000
.54716E-14	0.00000	-.90458E-12	0.00000	.18444E+00	0.00000	.12552E+00	0.00000	.60479E-14	0.00000	-.11612E-12	0.00000
.13857E-13	0.00000	-.65425E-12	0.00000	-.18444E+00	0.00000	-.12552E+00	0.00000	.12937E-13	0.00000	-.29086E-13	0.00000
-.43599E-14	0.00000	.38512E-12	0.00000	-.10764E+00	0.00000	.91955E-01	0.00000	.16031E-13	0.00000	-.31952E-13	0.00000
.11255E-13	0.00000	.21190E-12	0.00000	.10764E+00	0.00000	-.91955E-01	0.00000	.13457E-13	0.00000	.30512E-13	0.00000

NATURAL FREQUENCY= .177482E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.15966E-13	0.00000	-.97720E-01	0.00000	.19022E-12	0.00000	.26387E-12	0.00000	.11884E-13	0.00000	.10009E-13	0.00000
.35229E-13	0.00000	-.97720E-01	0.00000	-.18938E-12	0.00000	-.21503E-12	0.00000	.25462E-13	0.00000	-.26112E-13	0.00000
-.19683E-13	0.00000	.25583E+00	0.00000	-.61458E-12	0.00000	-.26507E-12	0.00000	.92429E-14	0.00000	.78612E-15	0.00000
.35879E-14	0.00000	.25583E+00	0.00000	.53825E-12	0.00000	.44443E-13	0.00000	-.32982E-14	0.00000	-.25096E-13	0.00000
.18357E-13	0.00000	-.31623E+00	0.00000	.45643E-12	0.00000	-.91704E-12	0.00000	.15626E-13	0.00000	.25195E-13	0.00000
.40683E-13	0.00000	-.31623E+00	0.00000	-.42794E-12	0.00000	.59846E-12	0.00000	.16100E-13	0.00000	-.31781E-13	0.00000
.34749E-13	0.00000	.25583E+00	0.00000	.37926E-12	0.00000	.85127E-12	0.00000	-.16993E-13	0.00000	-.37434E-14	0.00000
-.20961E-13	0.00000	.25583E+00	0.00000	-.30985E-12	0.00000	-.78259E-12	0.00000	-.11384E-13	0.00000	-.30689E-13	0.00000
-.66669E-14	0.00000	-.97720E-01	0.00000	-.58729E-12	0.00000	.28426E-12	0.00000	.21159E-13	0.00000	-.29856E-13	0.00000
.32296E-15	0.00000	-.97720E-01	0.00000	.63980E-12	0.00000	.62435E-13	0.00000	.55549E-14	0.00000	.98358E-14	0.00000
-.43102E-14	0.00000	-.97720E-01	0.00000	.17542E-12	0.00000	-.37222E-12	0.00000	-.23016E-13	0.00000	.93550E-14	0.00000
-.55235E-14	0.00000	-.97720E-01	0.00000	-.25273E-12	0.00000	.56528E-12	0.00000	-.10932E-13	0.00000	.16348E-13	0.00000
.10745E-13	0.00000	.25583E+00	0.00000	-.15995E-13	0.00000	.69775E-13	0.00000	-.21939E-14	0.00000	-.57525E-13	0.00000
.12812E-14	0.00000	.25583E+00	0.00000	-.82032E-13	0.00000	-.19746E-12	0.00000	-.19556E-14	0.00000	.48670E-13	0.00000
-.20464E-13	0.00000	-.31623E+00	0.00000	-.57378E-14	0.00000	-.11178E-12	0.00000	.25477E-13	0.00000	-.29477E-13	0.00000
.58336E-14	0.00000	-.31623E+00	0.00000	-.72922E-14	0.00000	-.74038E-13	0.00000	.27446E-13	0.00000	-.10561E-13	0.00000
-.16194E-13	0.00000	.25583E+00	0.00000	.99185E-14	0.00000	.53205E-13	0.00000	-.12221E-13	0.00000	-.21607E-13	0.00000
-.80068E-14	0.00000	.25583E+00	0.00000	.57215E-14	0.00000	-.13657E-12	0.00000	-.16023E-13	0.00000	.32451E-13	0.00000
.14572E-13	0.00000	-.97720E-01	0.00000	-.20759E-13	0.00000	.23042E-13	0.00000	.22869E-13	0.00000	-.16741E-13	0.00000
.66273E-14	0.00000	-.97720E-01	0.00000	.44023E-13	0.00000	-.28554E-14	0.00000	.24439E-13	0.00000	.35298E-13	0.00000

NATURAL FREQUENCY= .178633E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.16469E-13	0.00000	-.11041E-12	0.00000	.18747E-01	0.00000	-.13575E-01	0.00000	.19412E-13	0.00000	.36506E-13	0.00000
-.25499E-13	0.00000	.14264E-12	0.00000	-.18747E-01	0.00000	.13575E-01	0.00000	.14688E-14	0.00000	.27065E-14	0.00000
-.53656E-13	0.00000	.11480E-12	0.00000	.63142E-01	0.00000	.15243E+00	0.00000	.47334E-14	0.00000	-.10549E-13	0.00000
.29717E-13	0.00000	-.21842E-12	0.00000	-.63142E-01	0.00000	-.15243E+00	0.00000	.92015E-14	0.00000	.18152E-13	0.00000
.20612E-14	0.00000	.24805E-12	0.00000	-.18840E+00	0.00000	.86491E-02	0.00000	-.23880E-13	0.00000	-.20662E-13	0.00000
.23785E-13	0.00000	-.10239E-12	0.00000	.18840E+00	0.00000	-.86491E-02	0.00000	-.29282E-13	0.00000	-.12684E-13	0.00000
.37575E-13	0.00000	-.90382E-13	0.00000	.52706E-01	0.00000	-.30423E+00	0.00000	.17257E-13	0.00000	.33856E-14	0.00000
.15492E-13	0.00000	-.42905E-13	0.00000	-.52706E-01	0.00000	.30423E+00	0.00000	.37017E-13	0.00000	.32606E-14	0.00000
-.39105E-14	0.00000	-.16523E-12	0.00000	.22327E+00	0.00000	.20368E+00	0.00000	-.14802E-14	0.00000	.45194E-13	0.00000
-.15066E-14	0.00000	.20519E-12	0.00000	-.22327E+00	0.00000	-.20368E+00	0.00000	.87002E-14	0.00000	-.90780E-13	0.00000
.46793E-14	0.00000	-.49752E-13	0.00000	-.22327E+00	0.00000	.20368E+00	0.00000	-.20627E-13	0.00000	-.34515E-13	0.00000
-.53510E-14	0.00000	.13484E-12	0.00000	.22327E+00	0.00000	-.20368E+00	0.00000	-.93856E-14	0.00000	-.24446E-13	0.00000
-.20992E-14	0.00000	.82275E-14	0.00000	-.52706E-01	0.00000	-.30423E+00	0.00000	.16683E-13	0.00000	-.62331E-13	0.00000
.41993E-14	0.00000	-.17724E-12	0.00000	.52706E-01	0.00000	.30423E+00	0.00000	.14905E-13	0.00000	.60109E-13	0.00000
.12955E-13	0.00000	.22175E-12	0.00000	.18840E+00	0.00000	.86491E-02	0.00000	-.54363E-14	0.00000	.30833E-13	0.00000
.65883E-14	0.00000	-.98407E-14	0.00000	-.18840E+00	0.00000	-.86491E-02	0.00000	-.19520E-14	0.00000	-.20518E-13	0.00000
-.46315E-14	0.00000	-.32750E-13	0.00000	-.63142E-01	0.00000	.15243E+00	0.00000	-.92046E-14	0.00000	-.14972E-13	0.00000
.16179E-13	0.00000	-.13613E-12	0.00000	.63142E-01	0.00000	-.15243E+00	0.00000	-.18480E-13	0.00000	-.26039E-13	0.00000
-.43252E-14	0.00000	-.12520E-13	0.00000	-.18747E-01	0.00000	-.13575E-01	0.00000	.27309E-13	0.00000	-.13923E-13	0.00000
-.12090E-13	0.00000	.76259E-13	0.00000	.18747E-01	0.00000	.13575E-01	0.00000	.32426E-13	0.00000	.19817E-13	0.00000

NATURAL FREQUENCY= .178690E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.40344E-13	0.00000	.20738E-13	0.00000	-.54197E-01	0.00000	-.45338E-01	0.00000	.60308E-14	0.00000	.30541E-13	0.00000
-.10470E-13	0.00000	-.63207E-13	0.00000	.54197E-01	0.00000	.45338E-01	0.00000	-.48098E-14	0.00000	-.32756E-14	0.00000
.47483E-13	0.00000	.38267E-13	0.00000	.99360E-01	0.00000	-.74578E-01	0.00000	-.13098E-13	0.00000	.63733E-13	0.00000
-.66436E-14	0.00000	.21886E-12	0.00000	-.99360E-01	0.00000	.74578E-01	0.00000	-.32842E-14	0.00000	-.86996E-15	0.00000
.39432E-14	0.00000	-.11010E-12	0.00000	.45753E-01	0.00000	.24886E+00	0.00000	.72807E-14	0.00000	-.11004E-12	0.00000
-.32285E-13	0.00000	-.78659E-13	0.00000	-.45753E-01	0.00000	-.24886E+00	0.00000	-.16466E-13	0.00000	.32433E-13	0.00000
-.41706E-13	0.00000	.17917E-12	0.00000	-.23877E+00	0.00000	-.74627E-01	0.00000	-.59916E-14	0.00000	.92119E-14	0.00000
.19373E-13	0.00000	-.29500E-13	0.00000	.23877E+00	0.00000	.74627E-01	0.00000	.35621E-14	0.00000	.11972E-13	0.00000
-.24808E-13	0.00000	.66879E-13	0.00000	.14785E+00	0.00000	-.28480E+00	0.00000	.62132E-15	0.00000	.43880E-13	0.00000
.32531E-13	0.00000	.86873E-14	0.00000	-.14785E+00	0.00000	.28480E+00	0.00000	.30391E-13	0.00000	.49761E-13	0.00000
.66336E-14	0.00000	-.29449E-12	0.00000	.14785E+00	0.00000	.28480E+00	0.00000	.85952E-14	0.00000	.78905E-13	0.00000
-.17601E-13	0.00000	-.16944E-14	0.00000	-.14785E+00	0.00000	-.28480E+00	0.00000	.10365E-13	0.00000	-.86346E-13	0.00000
.48859E-13	0.00000	.12249E-12	0.00000	-.23877E+00	0.00000	.74627E-01	0.00000	-.63308E-13	0.00000	-.87337E-13	0.00000
-.45053E-13	0.00000	.30584E-12	0.00000	.23877E+00	0.00000	-.74627E-01	0.00000	-.62940E-13	0.00000	.43640E-13	0.00000
-.10087E-12	0.00000	-.11428E-12	0.00000	.45753E-01	0.00000	-.24886E+00	0.00000	.56681E-13	0.00000	-.12688E-12	0.00000
.71516E-13	0.00000	-.37431E-12	0.00000	-.45753E-01	0.00000	.24886E+00	0.00000	.64450E-13	0.00000	.14003E-12	0.00000
.40711E-13	0.00000	.31783E-12	0.00000	.99360E-01	0.00000	.74578E-01	0.00000	-.36627E-13	0.00000	.98951E-13	0.00000
-.18310E-13	0.00000	.66778E-14	0.00000	-.99360E-01	0.00000	-.74578E-01	0.00000	-.39843E-13	0.00000	-.34032E-13	0.00000
-.89380E-14	0.00000	-.18635E-12	0.00000	-.54197E-01	0.00000	.45338E-01	0.00000	.10666E-14	0.00000	-.13989E-13	0.00000
.28377E-13	0.00000	.19525E-13	0.00000	.54197E-01	0.00000	-.45338E-01	0.00000	.22287E-14	0.00000	-.17649E-13	0.00000

NATURAL FREQUENCY= .180016E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.19441E-13	0.00000	-.85623E-01	0.00000	.14785E-01	0.00000	-.53013E-01	0.00000	.49448E-13	0.00000	.28262E-13	0.00000
.34395E-13	0.00000	.85623E-01	0.00000	.14785E-01	0.00000	-.53013E-01	0.00000	-.11651E-14	0.00000	-.12905E-14	0.00000
.12119E-13	0.00000	.14144E+00	0.00000	.27078E-01	0.00000	.23184E+00	0.00000	-.21080E-13	0.00000	.70764E-14	0.00000
.27335E-13	0.00000	-.14144E+00	0.00000	.27078E-01	0.00000	.23184E+00	0.00000	-.39192E-13	0.00000	-.50564E-13	0.00000
.69966E-13	0.00000	.88756E-01	0.00000	-.49063E-01	0.00000	.16354E+00	0.00000	.26181E-13	0.00000	-.28376E-13	0.00000
.69261E-14	0.00000	-.88756E-01	0.00000	-.49063E-01	0.00000	.16354E+00	0.00000	.24706E-13	0.00000	.24558E-13	0.00000
.12256E-13	0.00000	-.12754E+00	0.00000	-.39294E-01	0.00000	-.23487E+00	0.00000	-.52794E-14	0.00000	.57436E-13	0.00000
.10339E-14	0.00000	.12754E+00	0.00000	-.39294E-01	0.00000	-.23487E+00	0.00000	.12957E-13	0.00000	-.28962E-14	0.00000
.65102E-13	0.00000	-.10865E+00	0.00000	.46495E-01	0.00000	-.20303E+00	0.00000	-.36684E-13	0.00000	-.55504E-14	0.00000
-.24115E-13	0.00000	.10865E+00	0.00000	.46495E-01	0.00000	-.20303E+00	0.00000	-.29199E-13	0.00000	-.12795E-13	0.00000
-.88266E-14	0.00000	.10865E+00	0.00000	.46495E-01	0.00000	.20303E+00	0.00000	-.10256E-14	0.00000	-.13835E-13	0.00000
.12081E-13	0.00000	-.10865E+00	0.00000	.46495E-01	0.00000	.20303E+00	0.00000	-.89514E-15	0.00000	.67840E-13	0.00000
.11030E-13	0.00000	.12754E+00	0.00000	-.39294E-01	0.00000	.23487E+00	0.00000	.22544E-13	0.00000	.81321E-13	0.00000
.23301E-13	0.00000	-.12754E+00	0.00000	-.39294E-01	0.00000	.23487E+00	0.00000	.19934E-13	0.00000	-.29003E-13	0.00000
.79779E-13	0.00000	-.88756E-01	0.00000	-.49063E-01	0.00000	-.16354E+00	0.00000	-.26035E-13	0.00000	.73846E-13	0.00000
-.57331E-13	0.00000	.88756E-01	0.00000	-.49063E-01	0.00000	-.16354E+00	0.00000	-.25221E-13	0.00000	-.20348E-13	0.00000
-.12091E-13	0.00000	-.14144E+00	0.00000	.27078E-01	0.00000	-.23184E+00	0.00000	.18478E-13	0.00000	-.86982E-13	0.00000
-.80815E-14	0.00000	.14144E+00	0.00000	.27078E-01	0.00000	-.23184E+00	0.00000	.17588E-13	0.00000	.45875E-13	0.00000
-.50834E-13	0.00000	.85623E-01	0.00000	.14785E-01	0.00000	.53013E-01	0.00000	.89583E-14	0.00000	-.15515E-13	0.00000
-.56611E-14	0.00000	-.85623E-01	0.00000	.14785E-01	0.00000	.53013E-01	0.00000	.80220E-14	0.00000	.12222E-13	0.00000

NATURAL FREQUENCY= .184318E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.51710E-13	0.00000	.49469E-01	0.00000	.23563E-13	0.00000	-.20285E-13	0.00000	.80362E-14	0.00000	-.46567E-13	0.00000
-.28790E-15	0.00000	.49469E-01	0.00000	-.18341E-13	0.00000	-.43226E-13	0.00000	.12449E-13	0.00000	-.60413E-13	0.00000
.75404E-13	0.00000	-.14356E+00	0.00000	-.71488E-14	0.00000	.14553E-12	0.00000	.14386E-14	0.00000	-.52341E-14	0.00000
.16332E-13	0.00000	-.14356E+00	0.00000	.48833E-13	0.00000	.96948E-13	0.00000	.39993E-14	0.00000	.21955E-13	0.00000
.15134E-13	0.00000	.22361E+00	0.00000	-.62772E-13	0.00000	.31167E-13	0.00000	.79480E-14	0.00000	.20678E-13	0.00000
-.13405E-13	0.00000	.22361E+00	0.00000	.32092E-14	0.00000	.22086E-12	0.00000	.34412E-14	0.00000	.39053E-13	0.00000
-.19312E-13	0.00000	-.28176E+00	0.00000	.73919E-13	0.00000	-.10556E-12	0.00000	-.19331E-13	0.00000	-.51102E-13	0.00000
-.82021E-14	0.00000	-.28176E+00	0.00000	-.11910E-12	0.00000	-.16038E-12	0.00000	-.77850E-14	0.00000	-.70246E-14	0.00000
-.27891E-13	0.00000	.31233E+00	0.00000	-.14354E-13	0.00000	-.51660E-13	0.00000	.55238E-13	0.00000	.50538E-14	0.00000
.62629E-13	0.00000	.31233E+00	0.00000	.74532E-13	0.00000	-.26117E-12	0.00000	.45650E-13	0.00000	-.42104E-13	0.00000
.57759E-13	0.00000	-.31233E+00	0.00000	-.17447E-13	0.00000	.52040E-13	0.00000	-.16802E-13	0.00000	.48049E-13	0.00000
-.32086E-13	0.00000	-.31233E+00	0.00000	.96574E-13	0.00000	.19522E-12	0.00000	-.23411E-13	0.00000	-.31250E-13	0.00000
.15628E-13	0.00000	.28176E+00	0.00000	.33245E-13	0.00000	.15318E-12	0.00000	-.36864E-13	0.00000	-.23719E-13	0.00000
-.74957E-13	0.00000	.28176E+00	0.00000	-.86506E-13	0.00000	.23649E-12	0.00000	-.38613E-13	0.00000	.42366E-13	0.00000
-.87090E-13	0.00000	-.22361E+00	0.00000	-.36853E-13	0.00000	-.48893E-13	0.00000	.35971E-13	0.00000	-.76430E-13	0.00000
.49973E-13	0.00000	-.22361E+00	0.00000	-.45559E-13	0.00000	-.17858E-12	0.00000	.34181E-13	0.00000	.52649E-13	0.00000
.32189E-13	0.00000	.14356E+00	0.00000	-.78191E-14	0.00000	-.19483E-12	0.00000	-.15479E-13	0.00000	.92988E-13	0.00000
.13279E-13	0.00000	.14356E+00	0.00000	.46574E-13	0.00000	-.19449E-12	0.00000	-.18144E-13	0.00000	-.71471E-13	0.00000
-.12518E-13	0.00000	-.49469E-01	0.00000	.21974E-13	0.00000	.33375E-13	0.00000	-.90649E-14	0.00000	.30163E-13	0.00000
.61798E-14	0.00000	-.49469E-01	0.00000	.36454E-14	0.00000	.53534E-13	0.00000	-.11847E-13	0.00000	.11417E-14	0.00000

NATURAL FREQUENCY= .186602E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.15333E-13	0.00000	-.10191E+00	0.00000	.16216E-01	0.00000	-.48039E-01	0.00000	.66442E-14	0.00000	.49670E-13	0.00000
-.29240E-13	0.00000	.10191E+00	0.00000	.16216E-01	0.00000	-.48039E-01	0.00000	.26125E-13	0.00000	-.11238E-13	0.00000
-.50994E-13	0.00000	.20656E+00	0.00000	.53926E-02	0.00000	.23347E+00	0.00000	-.14934E-13	0.00000	-.20115E-13	0.00000
-.46346E-13	0.00000	-.20656E+00	0.00000	.53926E-02	0.00000	.23347E+00	0.00000	-.21781E-13	0.00000	-.52084E-14	0.00000
-.21787E-13	0.00000	-.20272E-01	0.00000	-.48856E-01	0.00000	-.26200E-01	0.00000	-.19441E-13	0.00000	-.77310E-14	0.00000
.30577E-13	0.00000	.20272E-01	0.00000	-.48856E-01	0.00000	-.26200E-01	0.00000	.10405E-13	0.00000	.70674E-14	0.00000
.44634E-13	0.00000	-.19675E+00	0.00000	.18608E-01	0.00000	-.23610E+00	0.00000	.11251E-13	0.00000	.64839E-14	0.00000
.28481E-13	0.00000	.19675E+00	0.00000	.18608E-01	0.00000	-.23610E+00	0.00000	-.82872E-14	0.00000	.10684E-13	0.00000
.64810E-13	0.00000	.12758E+00	0.00000	.40779E-01	0.00000	.15371E+00	0.00000	.11238E-14	0.00000	-.15821E-13	0.00000
-.44044E-14	0.00000	-.12758E+00	0.00000	.40779E-01	0.00000	.15371E+00	0.00000	-.50220E-14	0.00000	.23159E-13	0.00000
-.28977E-13	0.00000	.12758E+00	0.00000	-.40779E-01	0.00000	.15371E+00	0.00000	.56643E-14	0.00000	-.51212E-13	0.00000
.13341E-13	0.00000	-.12758E+00	0.00000	-.40779E-01	0.00000	.15371E+00	0.00000	.18563E-13	0.00000	.94281E-13	0.00000
-.38904E-13	0.00000	-.19675E+00	0.00000	-.18608E-01	0.00000	-.23610E+00	0.00000	.46625E-13	0.00000	.95520E-13	0.00000
.35711E-13	0.00000	.19675E+00	0.00000	-.18608E-01	0.00000	-.23610E+00	0.00000	.48677E-13	0.00000	-.92389E-13	0.00000
.71190E-13	0.00000	-.20272E-01	0.00000	.48856E-01	0.00000	-.26200E-01	0.00000	-.58284E-13	0.00000	.65157E-13	0.00000
-.72198E-13	0.00000	.20272E-01	0.00000	.48856E-01	0.00000	-.26200E-01	0.00000	-.55201E-13	0.00000	-.37974E-13	0.00000
-.10248E-13	0.00000	.20656E+00	0.00000	-.53926E-02	0.00000	.23347E+00	0.00000	.12814E-13	0.00000	-.10543E-12	0.00000
-.10985E-13	0.00000	-.20656E+00	0.00000	-.53926E-02	0.00000	.23347E+00	0.00000	.84164E-14	0.00000	.94852E-13	0.00000
-.27351E-13	0.00000	-.10191E+00	0.00000	-.16216E-01	0.00000	-.48039E-01	0.00000	.20400E-13	0.00000	.66868E-14	0.00000
-.61085E-14	0.00000	.10191E+00	0.00000	-.16216E-01	0.00000	-.48039E-01	0.00000	.27385E-13	0.00000	.33008E-13	0.00000

NATURAL FREQUENCY= .194483E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.37407E-13	0.00000	.10028E+00	0.00000	-.13396E-01	0.00000	.37738E-01	0.00000	-.20636E-13	0.00000	-.43785E-13	0.00000
.14430E-13	0.00000	-.10028E+00	0.00000	-.13396E-01	0.00000	.37738E-01	0.00000	-.21675E-13	0.00000	.15046E-13	0.00000
.26594E-13	0.00000	-.24415E+00	0.00000	.93521E-02	0.00000	-.19111E+00	0.00000	.30314E-13	0.00000	.37695E-13	0.00000
.46041E-13	0.00000	.24415E+00	0.00000	.93521E-02	0.00000	-.19111E+00	0.00000	.37813E-13	0.00000	-.40298E-13	0.00000
.47757E-13	0.00000	.18444E+00	0.00000	.21627E-01	0.00000	.15021E+00	0.00000	-.35621E-13	0.00000	.38354E-13	0.00000
-.59550E-13	0.00000	-.18444E+00	0.00000	.21627E-01	0.00000	.15021E+00	0.00000	-.45044E-13	0.00000	-.21479E-13	0.00000
.11517E-13	0.00000	.32933E-01	0.00000	-.32965E-01	0.00000	.26346E-01	0.00000	.21137E-13	0.00000	-.31628E-13	0.00000
-.29083E-13	0.00000	-.32933E-01	0.00000	-.32965E-01	0.00000	.26346E-01	0.00000	.23473E-13	0.00000	.44002E-13	0.00000
-.19978E-13	0.00000	-.22247E+00	0.00000	.15383E-01	0.00000	-.18023E+00	0.00000	.18129E-13	0.00000	-.38115E-13	0.00000
.32441E-13	0.00000	.22247E+00	0.00000	.15383E-01	0.00000	-.18023E+00	0.00000	.21509E-13	0.00000	-.65319E-14	0.00000
.20355E-13	0.00000	.22247E+00	0.00000	.15383E-01	0.00000	.18023E+00	0.00000	.12755E-13	0.00000	.33801E-13	0.00000
-.27336E-14	0.00000	-.22247E+00	0.00000	.15383E-01	0.00000	.18023E+00	0.00000	.15299E-13	0.00000	-.56317E-13	0.00000
.22709E-13	0.00000	-.32933E-01	0.00000	-.32965E-01	0.00000	-.26346E-01	0.00000	-.23657E-13	0.00000	-.96522E-14	0.00000
-.33577E-14	0.00000	.32933E-01	0.00000	-.32965E-01	0.00000	-.26346E-01	0.00000	-.18424E-13	0.00000	.34133E-13	0.00000
-.50528E-13	0.00000	-.18444E+00	0.00000	.21627E-01	0.00000	-.15021E+00	0.00000	-.23673E-14	0.00000	-.13808E-13	0.00000
.31700E-13	0.00000	.18444E+00	0.00000	.21627E-01	0.00000	-.15021E+00	0.00000	-.61524E-14	0.00000	.16046E-13	0.00000
-.10617E-13	0.00000	.24415E+00	0.00000	.93521E-02	0.00000	.19111E+00	0.00000	.48811E-14	0.00000	.30330E-13	0.00000
.16277E-13	0.00000	-.24415E+00	0.00000	.93521E-02	0.00000	.19111E+00	0.00000	.51714E-14	0.00000	-.14170E-13	0.00000
.29295E-13	0.00000	-.10029E+00	0.00000	-.13396E-01	0.00000	-.37738E-01	0.00000	.18961E-13	0.00000	.15655E-14	0.00000
-.28316E-13	0.00000	.10028E+00	0.00000	-.13396E-01	0.00000	-.37738E-01	0.00000	.14105E-13	0.00000	-.11251E-14	0.00000

NATURAL FREQUENCY= .201748E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.18913E-14	0.00000	.76970E-01	0.00000	-.89081E-02	0.00000	.24647E-01	0.00000	-.18414E-14	0.00000	-.82259E-14	0.00000
.16933E-13	0.00000	-.76970E-01	0.00000	-.89081E-02	0.00000	.24647E-01	0.00000	-.40883E-14	0.00000	-.24285E-15	0.00000
.74810E-14	0.00000	-.21570E+00	0.00000	.12501E-01	0.00000	-.12926E+00	0.00000	.26086E-13	0.00000	.55994E-13	0.00000
.31188E-13	0.00000	.21570E+00	0.00000	.12501E-01	0.00000	-.12926E+00	0.00000	.33109E-13	0.00000	-.28060E-13	0.00000
.35522E-13	0.00000	.27205E+00	0.00000	-.68942E-03	0.00000	.16689E+00	0.00000	-.38033E-13	0.00000	.24769E-13	0.00000
-.40363E-13	0.00000	-.27205E+00	0.00000	-.68942E-03	0.00000	.16689E+00	0.00000	-.18742E-13	0.00000	-.43627E-15	0.00000
-.34257E-14	0.00000	-.22193E+00	0.00000	-.10864E-01	0.00000	-.13600E+00	0.00000	.19631E-13	0.00000	-.28752E-13	0.00000
-.56561E-14	0.00000	.22193E+00	0.00000	-.10864E-01	0.00000	-.13600E+00	0.00000	.19164E-13	0.00000	.16687E-13	0.00000
-.13304E-14	0.00000	.85051E-01	0.00000	.17848E-01	0.00000	.52085E-01	0.00000	-.11064E-13	0.00000	-.23496E-13	0.00000
-.78403E-14	0.00000	-.85051E-01	0.00000	.17848E-01	0.00000	.52085E-01	0.00000	-.10871E-13	0.00000	.26960E-13	0.00000
-.85596E-14	0.00000	.85051E-01	0.00000	-.17848E-01	0.00000	.52085E-01	0.00000	.16604E-13	0.00000	.59279E-14	0.00000
.26325E-13	0.00000	-.85051E-01	0.00000	-.17848E-01	0.00000	.52085E-01	0.00000	.14268E-13	0.00000	-.56697E-14	0.00000
.63970E-14	0.00000	-.22193E+00	0.00000	.10864E-01	0.00000	-.13600E+00	0.00000	-.30976E-13	0.00000	-.16331E-13	0.00000
-.16135E-13	0.00000	.22193E+00	0.00000	.10864E-01	0.00000	-.13600E+00	0.00000	-.29942E-13	0.00000	.23285E-13	0.00000
-.81881E-14	0.00000	.27205E+00	0.00000	.68942E-03	0.00000	.16689E+00	0.00000	.92977E-14	0.00000	-.59659E-13	0.00000
.31811E-13	0.00000	-.27205E+00	0.00000	.68942E-03	0.00000	.16689E+00	0.00000	.98701E-14	0.00000	.25330E-13	0.00000
.12644E-13	0.00000	-.21570E+00	0.00000	-.12501E-01	0.00000	-.12926E+00	0.00000	-.12663E-13	0.00000	.25625E-15	0.00000
.22605E-13	0.00000	.21570E+00	0.00000	-.12501E-01	0.00000	-.12926E+00	0.00000	-.13123E-13	0.00000	.77490E-14	0.00000
-.87732E-14	0.00000	.76970E-01	0.00000	.89081E-02	0.00000	.24647E-01	0.00000	.11413E-13	0.00000	-.15362E-13	0.00000
-.30938E-13	0.00000	-.76970E-01	0.00000	.89081E-02	0.00000	.24647E-01	0.00000	.16220E-13	0.00000	.10275E-13	0.00000

NATURAL FREQUENCY= .205683E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.32840E-13	0.00000	-.41038E-01	0.00000	.43599E-02	0.00000	-.11944E-01	0.00000	.10619E-13	0.00000	-.91981E-14	0.00000
.17816E-13	0.00000	.41038E-01	0.00000	.43599E-02	0.00000	-.11944E-01	0.00000	.33577E-14	0.00000	-.29948E-14	0.00000
.16079E-13	0.00000	.12530E+00	0.00000	-.79334E-02	0.00000	.64384E-01	0.00000	-.74487E-14	0.00000	-.37028E-13	0.00000
-.12327E-13	0.00000	-.12530E+00	0.00000	-.79334E-02	0.00000	.64384E-01	0.00000	-.10372E-13	0.00000	.24068E-13	0.00000
-.40262E-14	0.00000	-.19778E+00	0.00000	.60912E-02	0.00000	-.10342E+00	0.00000	.22049E-13	0.00000	.75655E-14	0.00000
.22031E-13	0.00000	.19778E+00	0.00000	.60912E-02	0.00000	-.10342E+00	0.00000	.31748E-13	0.00000	.31130E-14	0.00000
.90380E-14	0.00000	.25048E+00	0.00000	-.38382E-02	0.00000	.13087E+00	0.00000	-.17025E-13	0.00000	-.24918E-13	0.00000
-.17765E-13	0.00000	-.25048E+00	0.00000	-.38382E-02	0.00000	.13087E+00	0.00000	-.17966E-13	0.00000	.59478E-14	0.00000
-.13336E-13	0.00000	-.27820E+00	0.00000	.13205E-02	0.00000	-.14532E+00	0.00000	.19369E-13	0.00000	.46750E-14	0.00000
.11997E-13	0.00000	.27820E+00	0.00000	.13205E-02	0.00000	-.14532E+00	0.00000	.19341E-13	0.00000	-.12602E-13	0.00000
.11078E-13	0.00000	.27820E+00	0.00000	.13205E-02	0.00000	.14532E+00	0.00000	-.10630E-13	0.00000	-.32864E-14	0.00000
-.85928E-14	0.00000	-.27820E+00	0.00000	.13205E-02	0.00000	.14532E+00	0.00000	-.95791E-14	0.00000	-.80217E-14	0.00000
-.10548E-13	0.00000	-.25048E+00	0.00000	-.38362E-02	0.00000	-.13087E+00	0.00000	.21686E-13	0.00000	.15251E-13	0.00000
.11550E-13	0.00000	.25048E+00	0.00000	-.38382E-02	0.00000	-.13087E+00	0.00000	.23591E-13	0.00000	-.19072E-14	0.00000
.12350E-14	0.00000	.19778E+00	0.00000	.60912E-02	0.00000	.10342E+00	0.00000	-.18378E-13	0.00000	.12115E-13	0.00000
.17032E-14	0.00000	-.19778E+00	0.00000	.60912E-02	0.00000	.10342E+00	0.00000	-.10088E-13	0.00000	-.14269E-14	0.00000
-.36122E-14	0.00000	-.12530E+00	0.00000	-.79334E-02	0.00000	-.64384E-01	0.00000	-.13334E-13	0.00000	-.13904E-13	0.00000
-.19951E-13	0.00000	.12530E+00	0.00000	-.79334E-02	0.00000	-.64384E-01	0.00000	-.12227E-13	0.00000	.16026E-13	0.00000
-.42160E-14	0.00000	.41038E-01	0.00000	.43599E-02	0.00000	.11944E-01	0.00000	.11125E-13	0.00000	-.13050E-15	0.00000
.13217E-13	0.00000	-.41038E-01	0.00000	.43599E-02	0.00000	.11944E-01	0.00000	.58210E-14	0.00000	.15049E-13	0.00000

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APPENDIX H

MODE SHAPES OF THE NATURAL FREQUENCIES FOR THE SPLIT-BEAM

NATURAL FREQUENCY= .668129E+02

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.33831E+00	0.00000	-.11278E-12	0.00000	.13014E-12	0.00000	.16719E-13	0.00000	-.15071E-12	0.00000	-.10454E+00	0.00000
-.33831E+00	0.00000	-.95724E-13	0.00000	.11619E-12	0.00000	.20081E-13	0.00000	-.12233E-12	0.00000	-.10454E+00	0.00000
-.13026E+00	0.00000	-.12099E-12	0.00000	.15358E-12	0.00000	-.39354E-13	0.00000	-.14340E-12	0.00000	-.98263E-01	0.00000
-.13026E+00	0.00000	-.12703E-12	0.00000	.18942E-12	0.00000	-.22974E-15	0.00000	-.15891E-12	0.00000	-.98263E-01	0.00000
.53843E-01	0.00000	-.10591E-12	0.00000	.12595E-12	0.00000	-.19140E-13	0.00000	-.10158E-12	0.00000	-.78569E-01	0.00000
.53843E-01	0.00000	-.11567E-12	0.00000	.13111E-12	0.00000	-.21333E-13	0.00000	-.10136E-12	0.00000	-.78569E-01	0.00000
.18333E+00	0.00000	-.12141E-12	0.00000	.70055E-13	0.00000	-.13501E-13	0.00000	-.52133E-13	0.00000	-.44482E-01	0.00000
.18333E+00	0.00000	-.12119E-12	0.00000	.72999E-13	0.00000	.30601E-14	0.00000	-.60226E-13	0.00000	-.44482E-01	0.00000
.23140E+00	0.00000	-.14202E-12	0.00000	.59322E-13	0.00000	.46184E-14	0.00000	-.20236E-13	0.00000	.15960E-13	0.00000
.23140E+00	0.00000	-.13191E-12	0.00000	.55959E-13	0.00000						
.23140E+00	0.00000	-.14165E-12	0.00000	.85078E-13	0.00000						
.23140E+00	0.00000	-.13213E-12	0.00000	.71782E-13	0.00000	.34727E-14	0.00000	-.24020E-13	0.00000	.17992E-12	0.00000
.18333E+00	0.00000	-.13739E-12	0.00000	.66395E-13	0.00000	-.11886E-13	0.00000	-.62317E-13	0.00000	.44482E-01	0.00000
.18333E+00	0.00000	-.13076E-12	0.00000	.67530E-13	0.00000	-.19026E-13	0.00000	-.60672E-13	0.00000	.44482E-01	0.00000
.53843E-01	0.00000	-.14472E-12	0.00000	.12633E-13	0.00000	-.22284E-13	0.00000	-.89674E-13	0.00000	.78569E-01	0.00000
.53843E-01	0.00000	-.13890E-12	0.00000	.11891E-13	0.00000	-.45649E-13	0.00000	-.87159E-13	0.00000	.78569E-01	0.00000
.13026E+00	0.00000	-.13315E-12	0.00000	-.31148E-13	0.00000	-.13883E-13	0.00000	-.16595E-12	0.00000	.98263E-01	0.00000
.13026E+00	0.00000	-.15641E-12	0.00000	-.27060E-13	0.00000	-.74889E-14	0.00000	-.16459E-12	0.00000	.98263E-01	0.00000
.33831E+00	0.00000	-.13010E-12	0.00000	-.42010E-13	0.00000	-.46625E-14	0.00000	-.20394E-12	0.00000	.10454E+00	0.00000
.33831E+00	0.00000	-.14949E-12	0.00000	-.36979E-13	0.00000	-.39404E-14	0.00000	-.20442E-12	0.00000	.10454E+00	0.00000

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NATURAL FREQUENCY= .115108E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.28561E-12	0.00000	-.80966E-01	0.00000	-.32482E+00	0.00000	.88918E-01	0.00000	.25201E-12	0.00000	.13095E-12	0.00000
-.21446E-12	0.00000	.80966E-01	0.00000	-.32482E+00	0.00000	.88918E-01	0.00000	.22682E-12	0.00000	.10571E-12	0.00000
.43193E-13	0.00000	-.74478E-01	0.00000	-.13380E+00	0.00000	.87149E-01	0.00000	.18623E-12	0.00000	.91213E-13	0.00000
-.34739E-12	0.00000	.74475E-01	0.00000	-.13380E+00	0.00000	.87149E-01	0.00000	.19979E-12	0.00000	.70835E-13	0.00000
-.18760E-12	0.00000	-.58482E-01	0.00000	.46558E-01	0.00000	.72083E-01	0.00000	.12942E-12	0.00000	.79177E-13	0.00000
-.43326E-12	0.00000	.58482E-01	0.00000	.46558E-01	0.00000	.72083E-01	0.00000	.11580E-12	0.00000	.39062E-14	0.00000
-.37662E-12	0.00000	-.32607E-01	0.00000	.17966E+00	0.00000	.42041E-01	0.00000	.46762E-13	0.00000	.71090E-14	0.00000
-.41510F-12	0.00000	.32607E-01	0.00000	.17966E+00	0.00000	.42041E-01	0.00000	.29894E-13	0.00000	.11014E-13	0.00000
-.23700E-12	0.00000	-.15152E-12	0.00000	.23240E+00	0.00000	-.16767E-12	0.00000	-.41406E-13	0.00000	-.14166E-12	0.00000
-.46987E-12	0.00000	-.37519E-12	0.00000	.23240E+00	0.00000						
-.10955E-12	0.00000	-.10162E-12	0.00000	.23240E+00	0.00000						
.22865E-12	0.00000	.20549E-12	0.00000	.23240E+00	0.00000	.19598E-12	0.00000	-.33916E-13	0.00000	.52447E-13	0.00000
.26583E-13	0.00000	.32607E-01	0.00000	.17966E+00	0.00000	-.42041E-01	0.00000	-.15436E-12	0.00000	.33202E-14	0.00000
.29056E-12	0.00000	-.32607E-01	0.00000	.17966E+00	0.00000	-.42041E-01	0.00000	-.13468E-12	0.00000	-.62424E-14	0.00000
-.11671E-12	0.00000	.58482E-01	0.00000	.46558E-01	0.00000	-.72083E-01	0.00000	-.20236E-12	0.00000	.70247E-13	0.00000
.26047E-12	0.00000	-.58482E-01	0.00000	.46558E-01	0.00000	-.72083E-01	0.00000	-.20344E-12	0.00000	.22642E-13	0.00000
-.35689E-12	0.00000	.74478E-01	0.00000	-.13380E+00	0.00000	-.87149E-01	0.00000	-.28835E-12	0.00000	.12593E-12	0.00000
.19755E-12	0.00000	-.74478E-01	0.00000	-.13380E+00	0.00000	-.87149E-01	0.00000	-.27996E-12	0.00000	.59052E-13	0.00000
-.64991E-12	0.00000	.80966E-01	0.00000	-.32482E+00	0.00000	-.88918E-01	0.00000	-.35794E-12	0.00000	.12871E-12	0.00000
.40502E-13	0.00000	-.80966E-01	0.00000	-.32482E+00	0.00000	-.88918E-01	0.00000	-.33344E-12	0.00000	.81814E-13	0.00000

NATURAL FREQUENCY= .14063?E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.23596E+00	0.00000	.72035E-15	0.00000	-.58598E-13	0.00000	.12967E-13	0.00000	-.23101E+00	0.00000	-.97879E-02	0.00000
.23596E+00	0.00000	.33324E-13	0.00000	-.48481E-13	0.00000	.20366E-13	0.00000	-.23101E+00	0.00000	.97879E-02	0.00000
-.20366E+00	0.00000	.27953E-13	0.00000	-.47705E-13	0.00000	.35158E-13	0.00000	-.20069E+00	0.00000	-.16204E-01	0.00000
.20366E+00	0.00000	.47614E-13	0.00000	-.19035E-13	0.00000	.58095E-13	0.00000	-.20069E+00	0.00000	.16204E-01	0.00000
-.14999E+00	0.00000	.32768E-13	0.00000	-.23957E-13	0.00000	.17018E-15	0.00000	-.14799E+00	0.00000	-.23088E-01	0.00000
.14999E+00	0.00000	.31071E-13	0.00000	-.44383E-13	0.00000	.54495E-14	0.00000	-.14799E+00	0.00000	.23088E-01	0.00000
-.81106E-01	0.00000	.35511E-13	0.00000	-.67258E-14	0.00000	.65592E-14	0.00000	-.79322E-01	0.00000	-.25111E-01	0.00000
.81106E-01	0.00000	.61057E-13	0.00000	-.40238E-14	0.00000	-.45668E-14	0.00000	-.79322E-01	0.00000	.25111E-01	0.00000
-.16653E-01	0.00000	.52824E-13	0.00000	.27373E-14	0.00000	.29530E-14	0.00000	-.12063E-12	0.00000	-.16653E-01	0.00000
.16653E-01	0.00000	.57609E-13	0.00000	.21162E-14	0.00000						
.16653E-01	0.00000	.52412E-13	0.00000	.12779E-13	0.00000						
-.16653E-01	0.00000	.56687E-13	0.00000	.81047E-14	0.00000	.62059E-14	0.00000	-.11398E-12	0.00000	.16653E-01	0.00000
.81106E-01	0.00000	.64070E-13	0.00000	.22881E-13	0.00000	.13108E-13	0.00000	.79322E-01	0.00000	-.25111E-01	0.00000
-.81106E-01	0.00000	.57389E-13	0.00000	.14674E-13	0.00000	-.45192E-14	0.00000	.79322E-01	0.00000	.25111E-01	0.00000
.14999E+00	0.00000	.71936E-13	0.00000	-.14896E-13	0.00000	.13865E-13	0.00000	.14799E+00	0.00000	-.23088E-01	0.00000
-.14999E+00	0.00000	.56915E-13	0.00000	.57929E-14	0.00000	-.54571E-15	0.00000	.14799E+00	0.00000	.23088E-01	0.00000
.20366E+00	0.00000	.66611E-13	0.00000	-.83396E-14	0.00000	-.16669E-13	0.00000	.20069E+00	0.00000	-.16204E-01	0.00000
-.20366E+00	0.00000	.58091E-13	0.00000	-.15777E-13	0.00000	.15545E-13	0.00000	.20069E+00	0.00000	.16204E-01	0.00000
.23596E+00	0.00000	.74163E-13	0.00000	-.24800E-13	0.00000	-.13171E-13	0.00000	.23101E+00	0.00000	-.97879E-02	0.00000
-.23596E+00	0.00000	.59959E-13	0.00000	-.31305E-13	0.00000	-.90092E-14	0.00000	.23101E+00	0.00000	.97879E-02	0.00000

NATURAL FREQUENCY= .153451E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.25389E+00	0.00000	-.18274E-13	0.00000	.96531E-13	0.00000	.52532E-14	0.00000	.69065E-12	0.00000	.15492E+00	0.00000
.25389E+00	0.00000	.10769E-13	0.00000	.14809E-12	0.00000	-.17830E-15	0.00000	.67075E-12	0.00000	.15492E+00	0.00000
-.47750E-01	0.00000	-.67759E-15	0.00000	.81197E-13	0.00000	-.24348E-13	0.00000	.59703E-12	0.00000	.12594E+00	0.00000
-.47750E-01	0.00000	.53164E-15	0.00000	.13805E-12	0.00000	.41572E-13	0.00000	.55634E-12	0.00000	.12594E+00	0.00000
-.24339E+00	0.00000	.35780E-13	0.00000	.36341E-13	0.00000	-.33670E-13	0.00000	.45714E-12	0.00000	.52822E-01	0.00000
-.24339E+00	0.00000	-.25280E-13	0.00000	.36603E-13	0.00000	-.14478E-13	0.00000	.40857E-12	0.00000	.52822E-01	0.00000
-.25630E+00	0.00000	.39257E-13	0.00000	-.18778E-13	0.00000	-.36728E-13	0.00000	.15347E-12	0.00000	-.36860E-01	0.00000
-.25630E+00	0.00000	.29774E-14	0.00000	-.29621E-13	0.00000	-.23911E-13	0.00000	.15952E-12	0.00000	-.36860E-01	0.00000
-.97708E-01	0.00000	.29117E-13	0.00000	-.89227E-13	0.00000	-.10751E-13	0.00000	-.90725E-13	0.00000	-.97708E-01	0.00000
-.97708E-01	0.00000	.13607E-13	0.00000	-.78424E-13	0.00000						
.97708E-01	0.00000	.29152E-13	0.00000	-.97947E-13	0.00000						
.97708E-01	0.00000	.13965E-13	0.00000	-.11401E-12	0.00000	-.14285E-13	0.00000	-.98762E-13	0.00000	-.97708E-01	0.00000
.25630E+00	0.00000	.17548E-13	0.00000	-.11019E-12	0.00000	.23981E-13	0.00000	-.32113E-12	0.00000	-.36860E-01	0.00000
.25630E+00	0.00000	.28436E-13	0.00000	-.10160E-12	0.00000	.15129E-14	0.00000	-.31538E-12	0.00000	-.36860E-01	0.00000
.24339E+00	0.00000	.46472E-14	0.00000	-.65646E-13	0.00000	.44767E-13	0.00000	-.42658E-12	0.00000	.52822E-01	0.00000
.24339E+00	0.00000	.47008E-13	0.00000	-.53215E-13	0.00000	.36592E-13	0.00000	-.43629E-12	0.00000	.52822E-01	0.00000
.47750E-01	0.00000	-.82725E-14	0.00000	.21820E-13	0.00000	.32463E-13	0.00000	-.50732E-12	0.00000	.12594E+00	0.00000
.47750E-01	0.00000	.57548E-13	0.00000	.35782E-13	0.00000	.60219E-13	0.00000	-.50884E-12	0.00000	.12594E+00	0.00000
-.25389E+00	0.00000	-.77791E-14	0.00000	.12405E-12	0.00000	.35338E-13	0.00000	-.53193E-12	0.00000	.15492E+00	0.00000
-.25389E+00	0.00000	.68390E-13	0.00000	.11244E-12	0.00000	.45966E-13	0.00000	-.52108E-12	0.00000	.15492E+00	0.00000

NATURAL FREQUENCY= .233056E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.12054E-12	0.00000	.10806E+00	0.00000	.23579E+00	0.00000	-.12953E+00	0.00000	.15304E-12	0.00000	-.44499E-13	0.00000
.19768E-12	0.00000	-.10806E+00	0.00000	.23579E+00	0.00000	-.12953E+00	0.00000	.14403E-12	0.00000	-.85854E-13	0.00000
.11833E-12	0.00000	.87124E-01	0.00000	-.50067E-01	0.00000	-.11181E+00	0.00000	.95655E-13	0.00000	.29080E-13	0.00000
.23848E-13	0.00000	-.87124E-01	0.00000	-.50067E-01	0.00000	-.11181E+00	0.00000	.69256E-13	0.00000	-.54016E-13	0.00000
.74272E-13	0.00000	.44439E-01	0.00000	-.24715E+00	0.00000	-.50209E-01	0.00000	.26504E-14	0.00000	.41065E-13	0.00000
.70813E-13	0.00000	-.44439E-01	0.00000	-.24715E+00	0.00000	-.50209E-01	0.00000	-.11913E-14	0.00000	.16619E-13	0.00000
.42456E-13	0.00000	-.48312E-02	0.00000	-.25628E+00	0.00000	.29481E-01	0.00000	-.37687E-13	0.00000	.26488E-13	0.00000
.44201E-15	0.00000	.48312E-02	0.00000	-.25628E+00	0.00000	.29481E-01	0.00000	-.23086E-13	0.00000	.37075E-13	0.00000
.41496E-13	0.00000	-.37508E-01	0.00000	-.83410E-01	0.00000	.83410E-01	0.00000	-.17565E-13	0.00000	-.21645E-13	0.00000
.85705E-14	0.00000	.37508E-01	0.00000	-.83410E-01	0.00000						
.10775E-12	0.00000	-.37508E-01	0.00000	.83410E-01	0.00000						
.11066E-12	0.00000	.37508E-01	0.00000	.83410E-01	0.00000	.83410E-01	0.00000	-.41600E-13	0.00000	.40658E-13	0.00000
.10725E-12	0.00000	-.48312E-02	0.00000	.25628E+00	0.00000	.29481E-01	0.00000	-.59829E-13	0.00000	.16830E-14	0.00000
.57073E-13	0.00000	.48312E-02	0.00000	.25628E+00	0.00000	.29481E-01	0.00000	-.65709E-13	0.00000	.32428E-13	0.00000
.12692E-12	0.00000	.44439E-01	0.00000	.24715E+00	0.00000	-.50209E-01	0.00000	-.65214E-13	0.00000	-.17835E-13	0.00000
.56496E-13	0.00000	-.44439E-01	0.00000	.24715E+00	0.00000	-.50209E-01	0.00000	-.57832E-13	0.00000	.21501E-13	0.00000
.35587E-14	0.00000	.87124E-01	0.00000	.50067E-01	0.00000	-.11181E+00	0.00000	-.10418E-13	0.00000	-.46701E-13	0.00000
.28303E-13	0.00000	-.87124E-01	0.00000	.50067E-01	0.00000	-.11181E+00	0.00000	-.12867E-13	0.00000	.26084E-13	0.00000
.14605E-12	0.00000	.10806E+00	0.00000	-.23579E+00	0.00000	-.12953E+00	0.00000	.80921E-13	0.00000	-.62689E-13	0.00000
.13320E-13	0.00000	-.10806E+00	0.00000	-.23579E+00	0.00000	-.12953E+00	0.00000	.76493E-13	0.00000	.14846E-14	0.00000

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NATURAL FREQUENCY= .252664E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.23355E+00	0.00000	-.11666E-13	0.00000	-.12106E-12	0.00000	.48373E-13	0.00000	.21894E+00	0.00000	.31406E-01	0.00000
-.23355E+00	0.00000	.72457E-13	0.00000	-.13718E-12	0.00000	.59493E-13	0.00000	.21894E+00	0.00000	-.31406E-01	0.00000
.13305E+00	0.00000	-.64628E-15	0.00000	-.24875E-13	0.00000	.52284E-13	0.00000	.12783E+00	0.00000	.46474E-01	0.00000
-.13305E+00	0.00000	.32822E-13	0.00000	-.29016E-13	0.00000	.27737E-13	0.00000	.12783E+00	0.00000	-.46474E-01	0.00000
-.83790E-02	0.00000	-.10880E-13	0.00000	.66532E-13	0.00000	.32057E-13	0.00000	-.66988E-02	0.00000	.53259E-01	0.00000
.83790E-02	0.00000	.41036E-13	0.00000	.50437E-13	0.00000	.14144E-13	0.00000	-.66988E-02	0.00000	-.53259E-01	0.00000
-.14429E+00	0.00000	-.17324E-14	0.00000	.79246E-13	0.00000	.30743E-14	0.00000	-.13479E+00	0.00000	.39454E-01	0.00000
.14429E+00	0.00000	.22571E-14	0.00000	.93364E-13	0.00000	-.29511E-14	0.00000	-.13479E+00	0.00000	-.39454E-01	0.00000
-.21393E+00	0.00000	-.37603E-15	0.00000	.44173E-13	0.00000	-.21559E-13	0.00000	-.20528E+00	0.00000	.34187E-13	0.00000
.21393E+00	0.00000	-.16210E-13	0.00000	.41289E-13	0.00000						
-.21393E+00	0.00000	.42974E-14	0.00000	.12589E-14	0.00000						
.21393E+00	0.00000	-.17569E-13	0.00000	-.74542E-14	0.00000	-.21007E-13	0.00000	-.20528E+00	0.00000	.34696E-13	0.00000
-.14429E+00	0.00000	-.12850E-13	0.00000	-.67879E-13	0.00000	-.68961E-14	0.00000	-.13479E+00	0.00000	-.39454E-01	0.00000
.14429E+00	0.00000	-.21341E-13	0.00000	-.55521E-13	0.00000	-.17462E-13	0.00000	-.13479E+00	0.00000	.39454E-01	0.00000
-.83790E-02	0.00000	-.38935E-13	0.00000	-.83830E-13	0.00000	.94822E-14	0.00000	-.66988E-02	0.00000	-.53259E-01	0.00000
.83790E-02	0.00000	-.17699E-13	0.00000	-.73616E-13	0.00000	.18396E-13	0.00000	-.66988E-02	0.00000	.53259E-01	0.00000
.13305E+00	0.00000	-.57124E-13	0.00000	-.84106E-14	0.00000	.39587E-13	0.00000	.12783E+00	0.00000	-.46474E-01	0.00000
-.13305E+00	0.00000	-.29182E-14	0.00000	-.33933E-13	0.00000	.32195E-13	0.00000	.12783E+00	0.00000	.46474E-01	0.00000
.23355E+00	0.00000	-.66165E-13	0.00000	.57651E-13	0.00000	.45603E-13	0.00000	.21894E+00	0.00000	-.31406E-01	0.00000
-.23355E+00	0.00000	.29516E-14	0.00000	.68937E-13	0.00000	.37765E-13	0.00000	.21894E+00	0.00000	.31406E-01	0.00000

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NATURAL FREQUENCY= .305250E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.17055E+00	0.00000	-.21520E-12	0.00000	.48836E-14	0.00000	-.58290E-14	0.00000	-.10876E-11	0.00000	.20595E+00	0.00000
.17055E+00	0.00000	-.22557E-12	0.00000	.23008E-13	0.00000	-.10086E-13	0.00000	-.11005E-11	0.00000	.20595E+00	0.00000
-.19774E+00	0.00000	-.18821E-12	0.00000	.93598E-14	0.00000	.91383E-14	0.00000	-.45741E-12	0.00000	.10711E+00	0.00000
-.19774E+00	0.00000	-.17385E-12	0.00000	.90410E-14	0.00000	.25543E-13	0.00000	-.48828E-12	0.00000	.10711E+00	0.00000
-.23536E+00	0.00000	-.13571E-12	0.00000	-.60705E-14	0.00000	-.63226E-14	0.00000	.28630E-12	0.00000	-.60691E-01	0.00000
-.23536E+00	0.00000	-.13049E-12	0.00000	.65858E-14	0.00000	.18675E-13	0.00000	.27534E-12	0.00000	-.60691E-01	0.00000
.32838E-01	0.00000	-.67431E-13	0.00000	.35444E-14	0.00000	-.53256E-14	0.00000	.76694E-12	0.00000	-.12248E+00	0.00000
.32838E-01	0.00000	-.72893E-13	0.00000	.25422E-14	0.00000	.45692E-14	0.00000	.76783E-12	0.00000	-.12248E+00	0.00000
.22971E+00	0.00000	.16783E-13	0.00000	-.43695E-14	0.00000	-.11811E-14	0.00000	.78071E-12	0.00000	.24780E-13	0.00000
.22971E+00	0.00000	.13674E-13	0.00000	.35616E-15	0.00000						
.22971E+00	0.00000	.19307E-13	0.00000	-.34487E-14	0.00000						
.22971E+00	0.00000	.13578E-13	0.00000	-.64917E-14	0.00000	-.52965E-14	0.00000	.78693E-12	0.00000	-.16208E-12	0.00000
.32838E-01	0.00000	.73858E-13	0.00000	-.46751E-14	0.00000	.34791E-14	0.00000	.14344E-12	0.00000	.12248E+00	0.00000
.32838E-01	0.00000	.70870E-13	0.00000	-.36870E-14	0.00000	.28618E-14	0.00000	.14477E-12	0.00000	.12248E+00	0.00000
-.23536E+00	0.00000	.14546E-12	0.00000	-.13630E-14	0.00000	.98153E-14	0.00000	-.33119E-12	0.00000	.60691E-01	0.00000
-.23536E+00	0.00000	.14437E-12	0.00000	-.34726E-14	0.00000	.33973E-14	0.00000	-.33631E-12	0.00000	.60691E-01	0.00000
-.19774E+00	0.00000	.18208E-12	0.00000	.32638E-14	0.00000	-.18762E-14	0.00000	-.48939E-12	0.00000	-.10711E+00	0.00000
-.19774E+00	0.00000	.17731E-12	0.00000	-.27895E-14	0.00000	.10560E-13	0.00000	-.48983E-12	0.00000	-.10711E+00	0.00000
.17055E+00	0.00000	.21761E-12	0.00000	.17045E-14	0.00000	-.42859E-14	0.00000	-.44187E-12	0.00000	-.20595E+00	0.00000
.17055E+00	0.00000	.21466E-12	0.00000	.71663E-14	0.00000	-.77955E-15	0.00000	-.43565E-12	0.00000	-.20595E+00	0.00000

NATURAL FREQUENCY= .324055E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.21078E-13	0.00000	-.32827E+00	0.00000	.15454E-12	0.00000	.57795E-13	0.00000	.45190E-13	0.00000	-.70506E-13	0.00000
-.99160E-13	0.00000	-.32827E+00	0.00000	.15985E-12	0.00000	.63060E-13	0.00000	.39311E-13	0.00000	-.97536E-13	0.00000
.91549E-13	0.00000	-.28868E+00	0.00000	.22701E-12	0.00000	-.39734E-13	0.00000	-.12447E-14	0.00000	-.33259E-13	0.00000
.58351E-13	0.00000	-.28868E+00	0.00000	.24630E-12	0.00000	.45657E-14	0.00000	.35207E-13	0.00000	-.56325E-13	0.00000
.29685E-13	0.00000	-.21426E+00	0.00000	.15059E-12	0.00000	-.26653E-13	0.00000	-.44007E-15	0.00000	.59440E-13	0.00000
.67806E-13	0.00000	-.21426E+00	0.00000	.14572E-12	0.00000	-.49202E-13	0.00000	-.21415E-13	0.00000	.30850E-13	0.00000
-.68828E-13	0.00000	-.11401E+00	0.00000	-.12728E-12	0.00000	-.42066E-13	0.00000	-.34521E-13	0.00000	.56880E-13	0.00000
.71490E-14	0.00000	-.11401E+00	0.00000	-.14303E-12	0.00000	-.71356E-13	0.00000	-.39784E-13	0.00000	.37205E-13	0.00000
-.11831E-12	0.00000	-.40486E-14	0.00000	-.20643E-12	0.00000	.58944E-13	0.00000	-.16424E-13	0.00000	-.15536E-13	0.00000
-.90017E-13	0.00000	.67901E-13	0.00000	-.20192E-12	0.00000						
-.37363E-13	0.00000	.35887E-15	0.00000	-.19285E-12	0.00000						
.40175E-13	0.00000	.91683E-13	0.00000	-.20539E-12	0.00000	.74216E-13	0.00000	-.28680E-13	0.00000	.77720E-14	0.00000
-.94903E-14	0.00000	.11401E+00	0.00000	.97564E-13	0.00000	.10978E-12	0.00000	-.21072E-13	0.00000	-.13198E-13	0.00000
.53724E-13	0.00000	.11401E+00	0.00000	.96444E-13	0.00000	.11077E-12	0.00000	-.21246E-13	0.00000	-.10093E-13	0.00000
.53076E-13	0.00000	.21426E+00	0.00000	.30512E-12	0.00000	.55832E-14	0.00000	.42636E-14	0.00000	-.36233E-13	0.00000
.74618E-13	0.00000	.21426E+00	0.00000	.31681E-12	0.00000	.38929E-14	0.00000	-.66546E-14	0.00000	.26123E-13	0.00000
.51379E-13	0.00000	.28868E+00	0.00000	.18483E-12	0.00000	-.13134E-12	0.00000	.14920E-13	0.00000	.35857E-13	0.00000
.17965E-13	0.00000	.28868E+00	0.00000	.20008E-12	0.00000	-.12956E-12	0.00000	.52617E-14	0.00000	.18485E-13	0.00000
.29317E-13	0.00000	.32827E+00	0.00000	-.22950E-12	0.00000	-.20130E-12	0.00000	.22062E-13	0.00000	.40054E-13	0.00000
-.39456E-13	0.00000	.32827E+00	0.00000	-.22705E-12	0.00000	-.21837E-12	0.00000	.36207E-14	0.00000	.26636E-13	0.00000

NATURAL FREQUENCY= .384572E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.76092E-13	0.00000	.13198E+00	0.00000	.14991E+00	0.00000	-.16540E+00	0.00000	-.59373E-13	0.00000	-.61285E-13	0.00000
.68267E-13	0.00000	-.13188E+00	0.00000	.14991E+00	0.00000	-.16540E+00	0.00000	-.80005E-13	0.00000	-.23200E-13	0.00000
.53983E-14	0.00000	.87323E-01	0.00000	-.19181E+00	0.00000	-.99265E-01	0.00000	-.13005E-13	0.00000	-.14206E-13	0.00000
.58069E-13	0.00000	-.87323E-01	0.00000	-.19181E+00	0.00000	-.99265E-01	0.00000	-.21277E-13	0.00000	.20461E-13	0.00000
.21162E-13	0.00000	.20042E-01	0.00000	-.23758E+00	0.00000	.31961E-01	0.00000	.30251E-13	0.00000	-.61013E-15	0.00000
-.68645E-13	0.00000	-.20042E-01	0.00000	-.23758E+00	0.00000	.31961E-01	0.00000	.33255E-13	0.00000	.46266E-13	0.00000
.34450E-13	0.00000	-.16275E-01	0.00000	.29709E-01	0.00000	.91664E-01	0.00000	.50148E-13	0.00000	-.23583E-13	0.00000
-.15036E-12	0.00000	.16275E-01	0.00000	.29709E-01	0.00000	.91664E-01	0.00000	.73313E-13	0.00000	-.46646E-14	0.00000
.55986E-13	0.00000	-.37305E-13	0.00000	.24976E+00	0.00000	.55530E-13	0.00000	.47720E-13	0.00000	.23713E-14	0.00000
.12943E-13	0.00000	-.74033E-13	0.00000	.24976E+00	0.00000						
.46787E-13	0.00000	-.13430E-12	0.00000	.24976E+00	0.00000						
-.10628E-13	0.00000	-.17918E-13	0.00000	.24976E+00	0.00000	.36782E-13	0.00000	.43051E-13	0.00000	-.44588E-13	0.00000
-.83057E-13	0.00000	.16275E-01	0.00000	.29709E-01	0.00000	-.91664E-01	0.00000	-.44731E-13	0.00000	.41761E-13	0.00000
.54170E-13	0.00000	-.16275E-01	0.00000	.29709E-01	0.00000	-.91664E-01	0.00000	-.49025E-13	0.00000	-.69256E-14	0.00000
-.13615E-12	0.00000	-.20042E-01	0.00000	-.23758E+00	0.00000	-.31961E-01	0.00000	-.77758E-13	0.00000	-.11944E-13	0.00000
.84098E-13	0.00000	.20042E-01	0.00000	-.23758E+00	0.00000	-.31961E-01	0.00000	-.88550E-13	0.00000	.11502E-13	0.00000
-.14433E-13	0.00000	-.87323E-01	0.00000	-.19181E+00	0.00000	.99265E-01	0.00000	-.10178E-13	0.00000	-.49781E-13	0.00000
.16492E-13	0.00000	.87323E-01	0.00000	-.19181E+00	0.00000	.99265E-01	0.00000	-.12201E-13	0.00000	.19441E-13	0.00000
.10654E-12	0.00000	-.13188E+00	0.00000	.14991E+00	0.00000	.16540E+00	0.00000	.99712E-13	0.00000	-.51237E-13	0.00000
-.80000E-13	0.00000	.13188E+00	0.00000	.14991E+00	0.00000	.16540E+00	0.00000	.98103E-13	0.00000	.43392E-13	0.00000

NATURAL FREQUENCY= .409336E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.21324E+00	0.00000	-.76334E-14	0.00000	-.25154E-13	0.00000	-.64284E-14	0.00000	-.18405E+00	0.00000	-.76321E-01	0.00000
.21324E+00	0.00000	-.51135E-14	0.00000	-.38082E-13	0.00000	-.66584E-14	0.00000	-.18405E+00	0.00000	.76321E-01	0.00000
.12889E-01	0.00000	-.71987E-14	0.00000	-.48020E-13	0.00000	.82848E-14	0.00000	.80321E-02	0.00000	-.84010E-01	0.00000
-.12889E-01	0.00000	.23203E-13	0.00000	-.21631E-13	0.00000	.13208E-13	0.00000	.80321E-02	0.00000	.84010E-01	0.00000
.20422E+00	0.00000	-.76861E-14	0.00000	-.20531E-13	0.00000	.49495E-14	0.00000	.18113E+00	0.00000	-.39319E-01	0.00000
-.20422E+00	0.00000	-.21557E-14	0.00000	.54768E-14	0.00000	.16615E-13	0.00000	.18113E+00	0.00000	.39319E-01	0.00000
.20828E+00	0.00000	.15430E-13	0.00000	.18842E-13	0.00000	.73592E-15	0.00000	.18186E+00	0.00000	.30528E-01	0.00000
-.20828E+00	0.00000	-.32616E-14	0.00000	.93793E-14	0.00000	-.64767E-14	0.00000	.18186E+00	0.00000	-.30528E-01	0.00000
.52271E-01	0.00000	.22474E-14	0.00000	.20424E-14	0.00000	-.30580E-14	0.00000	.63014E-13	0.00000	.52271E-01	0.00000
-.52271E-01	0.00000	-.89796E-14	0.00000	.76070E-14	0.00000						
-.52271E-01	0.00000	.15577E-14	0.00000	-.20496E-14	0.00000						
.52271E-01	0.00000	-.97443E-14	0.00000	-.13676E-13	0.00000	-.10443E-13	0.00000	.63569E-13	0.00000	-.52271E-01	0.00000
-.20828E+00	0.00000	.10837E-13	0.00000	-.19512E-13	0.00000	.16408E-13	0.00000	-.18186E+00	0.00000	.30528E-01	0.00000
.20828E+00	0.00000	-.82655E-14	0.00000	-.63209E-14	0.00000	.35385E-14	0.00000	-.18186E+00	0.00000	-.30528E-01	0.00000
-.20422E+00	0.00000	-.18195E-13	0.00000	-.83523E-14	0.00000	-.15663E-13	0.00000	-.18113E+00	0.00000	-.39319E-01	0.00000
.20422E+00	0.00000	-.18551E-13	0.00000	-.11263E-14	0.00000	.49696E-14	0.00000	-.18113E+00	0.00000	.39319E-01	0.00000
-.12889E-01	0.00000	.63400E-14	0.00000	.21230E-13	0.00000	-.13621E-13	0.00000	-.80321E-02	0.00000	-.84010E-01	0.00000
.12889E-01	0.00000	-.10006E-13	0.00000	.31796E-14	0.00000	-.64755E-14	0.00000	-.80321E-02	0.00000	.84010E-01	0.00000
.21324E+00	0.00000	-.40767E-14	0.00000	.43198E-14	0.00000	-.27329E-14	0.00000	.18405E+00	0.00000	-.76321E-01	0.00000
-.21324E+00	0.00000	-.21239E-13	0.00000	.12353E-13	0.00000	-.61990E-14	0.00000	.18405E+00	0.00000	.76321E-01	0.00000

NATURAL FREQUENCY= .429383E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.11901E+00	0.00000	.40735E-13	0.00000	-.72042E-14	0.00000	-.53296E-13	0.00000	-.13813E-11	0.00000	.22907E+00	0.00000
.11901E+00	0.00000	-.29395E-13	0.00000	.36285E-13	0.00000	-.62662E-13	0.00000	-.14040E-11	0.00000	.22907E+00	0.00000
-.24276E+00	0.00000	.35800E-14	0.00000	-.90452E-13	0.00000	-.67068E-13	0.00000	.18750E-13	0.00000	.56443E-01	0.00000
-.24276E+00	0.00000	.19218E-13	0.00000	-.52401E-13	0.00000	.25839E-13	0.00000	.21777E-13	0.00000	.56443E-01	0.00000
-.82824E-01	0.00000	.20342E-13	0.00000	-.60572E-13	0.00000	.44334E-13	0.00000	.12721E-11	0.00000	-.13708E+00	0.00000
-.82824E-01	0.00000	.30841E-13	0.00000	-.29992E-13	0.00000	-.31133E-13	0.00000	.12637E-11	0.00000	-.13708E+00	0.00000
.24933E+00	0.00000	.22785E-13	0.00000	.51045E-14	0.00000	.80511E-14	0.00000	.12715E-11	0.00000	-.62697E-01	0.00000
.24933E+00	0.00000	.13366E-13	0.00000	.34718E-13	0.00000	.34511E-14	0.00000	.12645E-11	0.00000	-.62697E-01	0.00000
.14231E+00	0.00000	.15981E-13	0.00000	.30684E-13	0.00000	-.12630E-13	0.00000	.41906E-14	0.00000	.14231E+00	0.00000
.14231E+00	0.00000	-.23688E-14	0.00000	.20517E-13	0.00000						
-.14231E+00	0.00000	.16639E-13	0.00000	.26072E-14	0.00000						
-.14231E+00	0.00000	-.25849E-14	0.00000	.13028E-13	0.00000	-.65901E-14	0.00000	.23472E-14	0.00000	.14231E+00	0.00000
-.24933E+00	0.00000	-.61531E-14	0.00000	-.21894E-13	0.00000	-.15960E-13	0.00000	-.12200E-11	0.00000	-.62697E-01	0.00000
-.24933E+00	0.00000	-.28762E-13	0.00000	-.17330E-13	0.00000	.11414E-14	0.00000	-.12115E-11	0.00000	-.62697E-01	0.00000
.82824E-01	0.00000	.31384E-14	0.00000	-.19583E-13	0.00000	.34209E-14	0.00000	-.12261E-11	0.00000	-.13708E+00	0.00000
.82824E-01	0.00000	-.18204E-13	0.00000	-.26705E-13	0.00000	-.30986E-14	0.00000	-.12273E-11	0.00000	-.13708E+00	0.00000
.24276E+00	0.00000	-.11882E-13	0.00000	.13646E-14	0.00000	.77059E-14	0.00000	-.67353E-13	0.00000	.56443E-01	0.00000
.24276E+00	0.00000	-.41989E-13	0.00000	-.28044E-14	0.00000	.64924E-14	0.00000	-.62948E-13	0.00000	.56443E-01	0.00000
-.11901E+00	0.00000	-.15478E-13	0.00000	.20295E-13	0.00000	.43532E-15	0.00000	.12244E-11	0.00000	.22907E+00	0.00000
-.11901E+00	0.00000	-.26027E-13	0.00000	.25530E-13	0.00000	.13611E-14	0.00000	.12182E-11	0.00000	.22907E+00	0.00000

NATURAL FREQUENCY= .504272E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.20518E-12	0.00000	.17153E+00	0.00000	.39666E-01	0.00000	-.18145E+00	0.00000	.14170E-12	0.00000	.14041E-12	0.00000
.71614E-13	0.00000	-.17153E+00	0.00000	.39666E-01	0.00000	-.18145E+00	0.00000	.97754E-13	0.00000	-.31525E-13	0.00000
.10983E-12	0.00000	.11488E+00	0.00000	-.23721E+00	0.00000	-.60363E-01	0.00000	-.78988E-13	0.00000	.10517E-12	0.00000
.90733E-13	0.00000	-.11488E+00	0.00000	-.23721E+00	0.00000	-.60363E-01	0.00000	-.41747E-13	0.00000	-.63490E-13	0.00000
.15453E-12	0.00000	.60701E-01	0.00000	-.57233E-01	0.00000	.65742E-01	0.00000	-.12870E-12	0.00000	-.17456E-13	0.00000
.85911E-13	0.00000	-.60701E-01	0.00000	-.57233E-01	0.00000	.65742E-01	0.00000	-.12856E-12	0.00000	-.15438E-14	0.00000
.29054E-13	0.00000	.72363E-01	0.00000	.24151E+00	0.00000	.78242E-02	0.00000	-.40138E-13	0.00000	-.69157E-13	0.00000
.17925E-17	0.00000	-.72363E-01	0.00000	.24151E+00	0.00000	.78242E-02	0.00000	-.37192E-13	0.00000	.45343E-13	0.00000
.10186E-12	0.00000	.11589E+00	0.00000	.13053E+00	0.00000	-.13053E+00	0.00000	.10651E-12	0.00000	-.54829E-14	0.00000
.61024E-13	0.00000	-.11589E+00	0.00000	.13053E+00	0.00000						
.65626E-13	0.00000	.11589E+00	0.00000	-.13053E+00	0.00000						
.17305E-12	0.00000	-.11589E+00	0.00000	-.13053E+00	0.00000	-.13053E+00	0.00000	.10852E-12	0.00000	.30536E-13	0.00000
.85052E-13	0.00000	.72363E-01	0.00000	-.24151E+00	0.00000	.78242E-02	0.00000	.36801E-13	0.00000	.13123E-13	0.00000
.11573E-12	0.00000	-.72363E-01	0.00000	-.24151E+00	0.00000	.78242E-02	0.00000	.34590E-13	0.00000	-.46596E-13	0.00000
.12504E-12	0.00000	.60701E-01	0.00000	.57233E-01	0.00000	.65742E-01	0.00000	-.79716E-13	0.00000	-.44987E-13	0.00000
.10220E-12	0.00000	-.60701E-01	0.00000	.57233E-01	0.00000	.65742E-01	0.00000	-.79258E-13	0.00000	-.78738E-13	0.00000
.93133E-14	0.00000	.11438E+00	0.00000	.23721E+00	0.00000	-.60363E-01	0.00000	-.45699E-13	0.00000	-.39732E-13	0.00000
.10604E-12	0.00000	-.11488E+00	0.00000	.23721E+00	0.00000	-.60363E-01	0.00000	-.47675E-13	0.00000	.55930E-14	0.00000
.12649E-12	0.00000	.17153E+00	0.00000	-.39666E-01	0.00000	-.18145E+00	0.00000	.98640E-13	0.00000	-.39633E-13	0.00000
.93256E-13	0.00000	-.17153E+00	0.00000	-.39666E-01	0.00000	-.18145E+00	0.00000	.85397E-13	0.00000	.96693E-13	0.00000

NATURAL FREQUENCY= .509574E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.19612E+00	0.00000	-.12292E-12	0.00000	-.33386E-13	0.00000	.14720E-12	0.00000	-.16009E+00	0.00000	-.11109E+00	0.00000
.19612E+00	0.00000	.12628E-12	0.00000	-.32319E-13	0.00000	.13182E-12	0.00000	-.16009E+00	0.00000	.11109E+00	0.00000
.10960E+00	0.00000	-.69778E-13	0.00000	.19205E-12	0.00000	.49528E-13	0.00000	.88986E-01	0.00000	-.89681E-01	0.00000
-.10960E+00	0.00000	.11647E-12	0.00000	.19132E-12	0.00000	.52282E-13	0.00000	.88986E-01	0.00000	.89681E-01	0.00000
.23063E+00	0.00000	-.44988E-13	0.00000	.48054E-13	0.00000	-.63740E-13	0.00000	.19786E+00	0.00000	.15919E-01	0.00000
-.23063E+00	0.00000	.64087E-13	0.00000	.70848E-13	0.00000	-.12128E-13	0.00000	.19786E+00	0.00000	-.15919E-01	0.00000
.33669E-01	0.00000	-.37473E-13	0.00000	-.18588E-12	0.00000	.57449E-14	0.00000	.33682E-01	0.00000	.85691E-01	0.00000
-.33669E-01	0.00000	.75903E-13	0.00000	-.20091E-12	0.00000	-.16047E-13	0.00000	.33682E-01	0.00000	-.85691E-01	0.00000
-.17778E+00	0.00000	-.67040E-13	0.00000	-.12349E-12	0.00000	.11035E-12	0.00000	-.16044E+00	0.00000	.14828E-12	0.00000
.17778E+00	0.00000	.11175E-12	0.00000	-.11200E-12	0.00000						
-.17778E+00	0.00000	-.86238E-13	0.00000	.10053E-12	0.00000						
.17778E+00	0.00000	.11176E-12	0.00000	.92705E-13	0.00000	.10296E-12	0.00000	-.16044E+00	0.00000	.19859E-12	0.00000
.33669E-01	0.00000	-.49455E-13	0.00000	.18697E-12	0.00000	-.15793E-13	0.00000	.33682E-01	0.00000	-.85691E-01	0.00000
-.33669E-01	0.00000	.59963E-13	0.00000	.20501E-12	0.00000	-.11189E-13	0.00000	.33682E-01	0.00000	.85691E-01	0.00000
.23063E+00	0.00000	-.60983E-13	0.00000	-.41150E-13	0.00000	-.66249E-13	0.00000	.19786E+00	0.00000	-.15919E-01	0.00000
-.23063E+00	0.00000	.49149E-13	0.00000	-.38452E-13	0.00000	-.71366E-13	0.00000	.19786E+00	0.00000	.15919E-01	0.00000
.10960E+00	0.00000	-.11078E-12	0.00000	-.19160E-12	0.00000	.41514E-13	0.00000	.88986E-01	0.00000	.89681E-01	0.00000
-.10960E+00	0.00000	.78512E-13	0.00000	-.19373E-12	0.00000	.57097E-13	0.00000	.88986E-01	0.00000	-.89681E-01	0.00000
-.19612E+00	0.00000	-.15911E-12	0.00000	.29297E-13	0.00000	.14650E-12	0.00000	-.16009E+00	0.00000	.11109E+00	0.00000
.19612E+00	0.00000	.11776E-12	0.00000	.31547E-13	0.00000	.14652E-12	0.00000	-.16009E+00	0.00000	-.11109E+00	0.00000

NATURAL FREQUENCY= .621946E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.51498E-01	0.00000	.60896E-13	0.00000	-.46253E-13	0.00000	-.30347E-14	0.00000	-.30815E-12	0.00000	.24856E+00	0.00000
.51498E-01	0.00000	-.42638E-13	0.00000	-.52578E-13	0.00000	-.10624E-13	0.00000	-.28725E-12	0.00000	.24856E+00	0.00000
-.22535E+00	0.00000	.61991E-13	0.00000	.26224E-13	0.00000	.25276E-13	0.00000	.34568E-12	0.00000	-.40947E-01	0.00000
-.22535E+00	0.00000	-.10733E-13	0.00000	-.25985E-13	0.00000	.37585E-14	0.00000	.34581E-12	0.00000	-.40947E-01	0.00000
.18032E+00	0.00000	.31283E-13	0.00000	.27628E-13	0.00000	-.52936E-14	0.00000	.23316E-12	0.00000	-.13098E+00	0.00000
.18032E+00	0.00000	-.38661E-13	0.00000	.57331E-13	0.00000	-.14259E-13	0.00000	.25036E-12	0.00000	-.13098E+00	0.00000
.18413E+00	0.00000	.40611E-13	0.00000	-.28867E-14	0.00000	-.31645E-13	0.00000	-.30887E-12	0.00000	.11848E+00	0.00000
.18413E+00	0.00000	-.25829E-13	0.00000	.42830E-14	0.00000	-.17623E-13	0.00000	-.30402E-12	0.00000	.11848E+00	0.00000
-.19060E+00	0.00000	.19016E-13	0.00000	-.20615E-13	0.00000	.94375E-15	0.00000	-.11784E-12	0.00000	-.80036E-13	0.00000
-.19060E+00	0.00000	-.15083E-13	0.00000	-.19349E-13	0.00000						
-.19060E+00	0.00000	.17408E-13	0.00000	-.94613E-14	0.00000						
-.19060E+00	0.00000	-.14818E-13	0.00000	-.13074E-13	0.00000	.31107E-14	0.00000	-.11591E-12	0.00000	.26451E-12	0.00000
.18413E+00	0.00000	.14921E-13	0.00000	.22477E-13	0.00000	.12048E-13	0.00000	.42904E-12	0.00000	-.11848E+00	0.00000
.18413E+00	0.00000	-.36282E-13	0.00000	.27280E-13	0.00000	-.26219E-14	0.00000	.42073E-12	0.00000	-.11848E+00	0.00000
.18032E+00	0.00000	.13538E-13	0.00000	-.10756E-13	0.00000	-.20496E-13	0.00000	.44157E-13	0.00000	.13098E+00	0.00000
.18032E+00	0.00000	-.51466E-14	0.00000	-.12334E-13	0.00000	-.28097E-14	0.00000	.47193E-13	0.00000	.13098E+00	0.00000
-.22535E+00	0.00000	-.26182E-13	0.00000	-.28813E-13	0.00000	.61401E-15	0.00000	-.26993E-12	0.00000	.40947E-01	0.00000
-.22535E+00	0.00000	-.74717E-14	0.00000	-.34712E-13	0.00000	.22205E-14	0.00000	-.27355E-12	0.00000	.40947E-01	0.00000
.51498E-01	0.00000	-.20392E-13	0.00000	.32048E-13	0.00000	.32134E-13	0.00000	.53895E-13	0.00000	-.24856E+00	0.00000
.51498E-01	0.00000	.58241E-14	0.00000	.33227E-13	0.00000	.23461E-13	0.00000	.44663E-13	0.00000	-.24856E+00	0.00000

NATURAL FREQUENCY= .576674E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.86488E-14	0.00000	.30075E+00	0.00000	-.60498E-13	0.00000	-.14687E-13	0.00000	-.24803E-13	0.00000	-.48916E-13	0.00000
.39882E-14	0.00000	.30075E+00	0.00000	-.68100E-13	0.00000	-.19566E-13	0.00000	-.31324E-14	0.00000	-.28752E-13	0.00000
.20228E-13	0.00000	.18587E+00	0.00000	-.70553E-14	0.00000	.37128E-13	0.00000	.19176E-13	0.00000	.11623E-13	0.00000
.28673E-13	0.00000	.18587E+00	0.00000	-.28931E-13	0.00000	.87174E-14	0.00000	.64763E-14	0.00000	.47550E-14	0.00000
.33845E-14	0.00000	.43743E-13	0.00000	.33177E-13	0.00000	-.68413E-14	0.00000	.99123E-14	0.00000	-.21308E-14	0.00000
.38259E-13	0.00000	-.97780E-14	0.00000	.24732E-13	0.00000	-.11153E-13	0.00000	-.69902E-15	0.00000	-.20832E-14	0.00000
.26269E-13	0.00000	-.18587E+00	0.00000	.91946E-15	0.00000	-.18592E-13	0.00000	.25159E-13	0.00000	.13673E-13	0.00000
.38518E-13	0.00000	-.18587E+00	0.00000	.76673E-14	0.00000	-.11905E-13	0.00000	.12376E-14	0.00000	-.22887E-13	0.00000
.13577E-13	0.00000	-.30075E+00	0.00000	.48338E-15	0.00000	.27359E-13	0.00000	-.18219E-13	0.00000	.17469E-13	0.00000
.57323E-13	0.00000	-.30075E+00	0.00000	.13553E-13	0.00000						
.13182E-13	0.00000	-.30075E+00	0.00000	.64375E-13	0.00000						
.28308E-13	0.00000	-.30075E+00	0.00000	.66741E-13	0.00000	.22098E-13	0.00000	-.25709E-13	0.00000	.11624E-13	0.00000
.62977E-14	0.00000	-.18587E+00	0.00000	.17590E-12	0.00000	-.13660E-13	0.00000	.17088E-13	0.00000	.67176E-15	0.00000
.71707E-13	0.00000	-.18587E+00	0.00000	.14955E-12	0.00000	-.97487E-14	0.00000	.83072E-14	0.00000	.12047E-13	0.00000
.77179E-14	0.00000	-.25285E-13	0.00000	-.24652E-13	0.00000	-.62852E-13	0.00000	-.18200E-14	0.00000	.78159E-14	0.00000
.13815E-13	0.00000	.54927E-13	0.00000	-.16196E-13	0.00000	-.42639E-13	0.00000	-.15841E-14	0.00000	-.24544E-13	0.00000
.16757E-13	0.00000	.18587E+00	0.00000	-.22373E-12	0.00000	.43544E-13	0.00000	.24157E-14	0.00000	.59642E-14	0.00000
.50400E-13	0.00000	.18587E+00	0.00000	-.22498E-12	0.00000	.52963E-13	0.00000	.11951E-13	0.00000	.82578E-14	0.00000
.39272E-14	0.00000	.30075E+00	0.00000	.57494E-13	0.00000	.17875E-12	0.00000	.11324E-13	0.00000	-.31477E-13	0.00000
.18209E-13	0.00000	.30075E+00	0.00000	.46860E-13	0.00000	.18910E-12	0.00000	.21068E-13	0.00000	.82236E-14	0.00000

NATURAL FREQUENCY= .652664E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.13646E-13	0.00000	.23417E+00	0.00000	-.76656E-01	0.00000	-.17911E+00	0.00000	.11978E-14	0.00000	.25798E-13	0.00000
.33662E-13	0.00000	-.23417E+00	0.00000	-.76656E-01	0.00000	-.17911E+00	0.00000	-.55861E-13	0.00000	.43155E-13	0.00000
-.18685E-13	0.00000	.15599E+00	0.00000	-.14947E+00	0.00000	-.71965E-02	0.00000	.32677E-14	0.00000	.12407E-13	0.00000
.11016E-13	0.00000	-.15599E+00	0.00000	-.14947E+00	0.00000	-.71965E-02	0.00000	.15390E-13	0.00000	-.27690E-14	0.00000
.27750E-13	0.00000	.99824E-01	0.00000	.20048E+00	0.00000	.22355E-01	0.00000	-.57223E-14	0.00000	-.19848E-13	0.00000
-.16514E-13	0.00000	-.99824E-01	0.00000	.20048E+00	0.00000	.22355E-01	0.00000	-.22916E-13	0.00000	-.19769E-13	0.00000
-.14354E-13	0.00000	.75571E-01	0.00000	.16354E+00	0.00000	-.97273E-01	0.00000	-.28573E-13	0.00000	-.10304E-13	0.00000
.81416E-14	0.00000	-.75571E-01	0.00000	.16354E+00	0.00000	-.97273E-01	0.00000	-.39396E-13	0.00000	.49488E-13	0.00000
-.72936E-13	0.00000	-.25555E-12	0.00000	-.13789E+00	0.00000	-.10694E-12	0.00000	.12222E-13	0.00000	-.13240E-13	0.00000
-.12397E-13	0.00000	.79437E-13	0.00000	-.13789E+00	0.00000						
-.40001E-13	0.00000	-.23494E-12	0.00000	-.13789E+00	0.00000						
-.28581E-13	0.00000	.90579E-13	0.00000	-.13789E+00	0.00000	-.91971E-13	0.00000	.13007E-13	0.00000	.57904E-14	0.00000
.31035E-13	0.00000	-.75571E-01	0.00000	.16354E+00	0.00000	.97273E-01	0.00000	.77051E-14	0.00000	-.26637E-13	0.00000
.22201E-13	0.00000	.75571E-01	0.00000	.16354E+00	0.00000	.97273E-01	0.00000	.11419E-13	0.00000	-.17744E-13	0.00000
.33360E-13	0.00000	-.99824E-01	0.00000	.20048E+00	0.00000	-.22355E-01	0.00000	.82074E-14	0.00000	.30330E-14	0.00000
-.10204E-13	0.00000	.99824E-01	0.00000	.20048E+00	0.00000	-.22355E-01	0.00000	.88710E-14	0.00000	.19083E-14	0.00000
.71051E-14	0.00000	-.15599E+00	0.00000	-.14947E+00	0.00000	.71965E-02	0.00000	.14730E-13	0.00000	.14150E-13	0.00000
-.17620E-13	0.00000	.15599E+00	0.00000	-.14947E+00	0.00000	.71965E-02	0.00000	.13438E-13	0.00000	-.27823E-13	0.00000
.20862E-13	0.00000	-.23417E+00	0.00000	-.76656E-01	0.00000	.17911E+00	0.00000	.47812E-14	0.00000	-.51685E-13	0.00000
.47128E-13	0.00000	.23417E+00	0.00000	-.76656E-01	0.00000	.17911E+00	0.00000	.11950E-13	0.00000	-.46207E-13	0.00000

NATURAL FREQUENCY= .667464E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.14679E+00	0.00000	-.74219E-13	0.00000	.16389E-13	0.00000	.64468E-13	0.00000	.10980E+00	0.00000	.15409E+00	0.00000
.14679E+00	0.00000	.39866E-13	0.00000	.51664E-14	0.00000	.61581E-13	0.00000	.10980E+00	0.00000	-.15409E+00	0.00000
.21155E+00	0.00000	-.46053E-13	0.00000	.86751E-13	0.00000	.10469E-13	0.00000	-.16732E+00	0.00000	.50934E-01	0.00000
.21155E+00	0.00000	.17466E-13	0.00000	.77511E-13	0.00000	.73145E-14	0.00000	-.16732E+00	0.00000	-.50934E-01	0.00000
.73668E-01	0.00000	-.45175E-13	0.00000	-.24619E-13	0.00000	-.22497E-13	0.00000	-.58085E-01	0.00000	-.10300E+00	0.00000
.73668E-01	0.00000	.12433E-13	0.00000	-.21833E-13	0.00000	-.15739E-13	0.00000	-.58085E-01	0.00000	.10300E+00	0.00000
.23531E+00	0.00000	-.23221E-13	0.00000	-.68727E-13	0.00000	.12005E-13	0.00000	.18596E+00	0.00000	-.37264E-01	0.00000
.23531E+00	0.00000	.23832E-13	0.00000	-.69242E-13	0.00000	.21058E-13	0.00000	.18596E+00	0.00000	.37264E-01	0.00000
.87815E-01	0.00000	-.68162E-14	0.00000	.26287E-14	0.00000	.14984E-13	0.00000	-.58575E-13	0.00000	.87815E-01	0.00000
.87815E-01	0.00000	.23473E-13	0.00000	-.50156E-14	0.00000						
.87815E-01	0.00000	-.66474E-14	0.00000	.27910E-13	0.00000						
.87815E-01	0.00000	.23499E-13	0.00000	.27457E-13	0.00000	.12718E-13	0.00000	-.63996E-13	0.00000	-.87815E-01	0.00000
.23531E+00	0.00000	.36043E-13	0.00000	-.11806E-13	0.00000	.56647E-14	0.00000	-.18596E+00	0.00000	-.37264E-01	0.00000
.23531E+00	0.00000	-.78545E-14	0.00000	-.19445E-13	0.00000	-.17571E-13	0.00000	-.18596E+00	0.00000	.37264E-01	0.00000
.73668E-01	0.00000	.29595E-13	0.00000	-.47831E-13	0.00000	.13772E-13	0.00000	.58085E-01	0.00000	-.10300E+00	0.00000
.73668E-01	0.00000	-.68446E-14	0.00000	-.40180E-13	0.00000	-.28472E-14	0.00000	.58085E-01	0.00000	.10300E+00	0.00000
.21155E+00	0.00000	.39218E-13	0.00000	.30130E-13	0.00000	-.11097E-13	0.00000	.16732E+00	0.00000	.50934E-01	0.00000
.21155E+00	0.00000	-.24804E-13	0.00000	.28757E-13	0.00000	-.83111E-14	0.00000	.16732E+00	0.00000	-.50934E-01	0.00000
.14679E+00	0.00000	.57784E-13	0.00000	.16858E-13	0.00000	-.35395E-13	0.00000	-.10980E+00	0.00000	.15409E+00	0.00000
.14679E+00	0.00000	-.50073E-13	0.00000	.15338E-13	0.00000	-.36279E-13	0.00000	-.10980E+00	0.00000	-.15409E+00	0.00000

NATURAL FREQUENCY= .657913E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.12363E-12	0.00000	.12503E+00	0.00000	-.18697E+00	0.00000	.12634E-01	0.00000	-.84217E-13	0.00000	-.80421E-13	0.00000
.13630E-12	0.00000	-.12503E+00	0.00000	-.18697E+00	0.00000	.12634E-01	0.00000	-.13061E-12	0.00000	.19289E-12	0.00000
.10535E-12	0.00000	.15386E+00	0.00000	.10112E+00	0.00000	-.58393E-02	0.00000	.15564E-12	0.00000	-.32013E-13	0.00000
.23630E-12	0.00000	-.15386E+00	0.00000	.10112E+00	0.00000	-.58393E-02	0.00000	.11539E-12	0.00000	.44237E-13	0.00000
.88622E-13	0.00000	.20402E+00	0.00000	.92495E-01	0.00000	-.13195E+00	0.00000	.65231E-13	0.00000	.42964E-13	0.00000
.55123E-13	0.00000	-.20402E+00	0.00000	.92495E-01	0.00000	-.13195E+00	0.00000	.29134E-13	0.00000	-.11844E-12	0.00000
.14561E-12	0.00000	.20038E+00	0.00000	-.15156E+00	0.00000	-.10212E+00	0.00000	-.18507E-12	0.00000	.49429E-13	0.00000
.21876E-12	0.00000	-.20038E+00	0.00000	-.15156E+00	0.00000	-.10212E+00	0.00000	-.13550E-12	0.00000	-.30678E-14	0.00000
.91554E-13	0.00000	.16206E+00	0.00000	-.17825E-01	0.00000	.17825E-01	0.00000	-.34731E-13	0.00000	-.57543E-13	0.00000
.65436E-13	0.00000	-.16206E+00	0.00000	-.17825E-01	0.00000						
.69068E-13	0.00000	.16206E+00	0.00000	.17825E-01	0.00000						
.71691E-13	0.00000	-.16206E+00	0.00000	.17825E-01	0.00000	.17825E-01	0.00000	.13413E-13	0.00000	.51564E-13	0.00000
.24633E-12	0.00000	.20038E+00	0.00000	.15156E+00	0.00000	-.10212E+00	0.00000	.17007E-12	0.00000	.57212E-13	0.00000
.19176E-12	0.00000	-.20038E+00	0.00000	.15156E+00	0.00000	-.10212E+00	0.00000	.18015E-12	0.00000	-.22326E-13	0.00000
.70929E-13	0.00000	.20402E+00	0.00000	-.92495E-01	0.00000	-.13195E+00	0.00000	-.51573E-13	0.00000	.99038E-13	0.00000
.29950E-13	0.00000	-.20402E+00	0.00000	-.92495E-01	0.00000	-.13195E+00	0.00000	-.57065E-13	0.00000	-.85675E-13	0.00000
-.17500E-12	0.00000	.15386E+00	0.00000	-.10112E+00	0.00000	-.58393E-02	0.00000	-.13681E-12	0.00000	-.28219E-13	0.00000
.17361E-12	0.00000	-.15386E+00	0.00000	-.10112E+00	0.00000	-.58393E-02	0.00000	-.15662E-12	0.00000	.40207E-13	0.00000
.13465E-12	0.00000	.12503E+00	0.00000	.18697E+00	0.00000	.12634E-01	0.00000	.11244E-12	0.00000	-.13106E-12	0.00000
-.14515E-12	0.00000	-.12503E+00	0.00000	.18697E+00	0.00000	.12634E-01	0.00000	.10074E-12	0.00000	.16092E-12	0.00000

NATURAL FREQUENCY= .746484E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.12239E-01	0.00000	.14906E-13	0.00000	-.51861E-13	0.00000	.37961E-13	0.00000	.23456E-12	0.00000	-.25843E+00	0.00000
-.12239E-01	0.00000	.14886E-13	0.00000	-.53616E-13	0.00000	.17454E-13	0.00000	.30479E-12	0.00000	-.25843E+00	0.00000
.17402E+00	0.00000	.59213E-13	0.00000	.50088E-13	0.00000	.93059E-14	0.00000	-.44834E-12	0.00000	.95880E-01	0.00000
.17402E+00	0.00000	-.51299E-13	0.00000	-.29941E-14	0.00000	-.35793E-13	0.00000	-.51282E-12	0.00000	.95880E-01	0.00000
-.27552E+00	0.00000	.74963E-14	0.00000	.54271E-14	0.00000	-.21482E-13	0.00000	.12038E-12	0.00000	.40324E-01	0.00000
-.27552E+00	0.00000	-.32194E-13	0.00000	-.35227E-13	0.00000	-.23560E-13	0.00000	.13513E-12	0.00000	.40324E-01	0.00000
.63539E-01	0.00000	-.54395E-14	0.00000	-.68947E-14	0.00000	.13981E-13	0.00000	.38108E-12	0.00000	-.15909E+00	0.00000
.63539E-01	0.00000	-.21357E-13	0.00000	-.35810E-14	0.00000	.10974E-13	0.00000	.36843E-12	0.00000	-.15909E+00	0.00000
.15993E+00	0.00000	-.22846E-13	0.00000	.62985E-13	0.00000	-.48546E-14	0.00000	-.31278E-12	0.00000	.15993E+00	0.00000
.15993E+00	0.00000	-.81335E-14	0.00000	.57248E-13	0.00000						
-.15993E+00	0.00000	-.23826E-13	0.00000	.53727E-13	0.00000						
-.15993E+00	0.00000	-.85462E-14	0.00000	.43029E-13	0.00000	-.87836E-14	0.00000	-.32053E-12	0.00000	.15993E+00	0.00000
-.63539E-01	0.00000	-.40179E-13	0.00000	-.62480E-13	0.00000	-.87267E-14	0.00000	.36603E-12	0.00000	-.15909E+00	0.00000
-.63539E-01	0.00000	.33050E-13	0.00000	-.59095E-13	0.00000	-.14965E-13	0.00000	.37070E-12	0.00000	-.15909E+00	0.00000
.27552E+00	0.00000	-.60635E-13	0.00000	-.12369E-13	0.00000	.19616E-13	0.00000	.18912E-12	0.00000	.40324E-01	0.00000
.27552E+00	0.00000	.61302E-13	0.00000	-.18679E-13	0.00000	.26935E-13	0.00000	.19331E-12	0.00000	.40324E-01	0.00000
-.17402E+00	0.00000	-.41279E-13	0.00000	.48400E-13	0.00000	-.17217E-14	0.00000	-.38069E-12	0.00000	.95880E-01	0.00000
-.17402E+00	0.00000	.54641E-13	0.00000	.50521E-13	0.00000	-.76394E-14	0.00000	-.38374E-12	0.00000	.95880E-01	0.00000
.12239E-01	0.00000	-.19539E-13	0.00000	-.42773E-13	0.00000	-.22698E-14	0.00000	.14832E-12	0.00000	-.25843E+00	0.00000
.12239E-01	0.00000	.39615E-13	0.00000	-.37139E-13	0.00000	-.31256E-14	0.00000	.14608E-12	0.00000	-.25843E+00	0.00000

NATURAL FREQUENCY= .756831E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.45345E-14	0.00000	.12978E+00	0.00000	-.19132E+00	0.00000	.52269E-01	0.00000	-.27400E-14	0.00000	.25074E-13	0.00000
.36492E-14	0.00000	-.12978E+00	0.00000	-.19132E+00	0.00000	.52269E-01	0.00000	-.19079E-13	0.00000	.54987E-13	0.00000
.30979E-14	0.00000	.16471E+00	0.00000	.20868E+00	0.00000	-.33167E-01	0.00000	.32543E-13	0.00000	.19515E-13	0.00000
.29467E-13	0.00000	-.16471E+00	0.00000	.20868E+00	0.00000	-.33167E-01	0.00000	.80492E-14	0.00000	-.14349E-13	0.00000
.41576E-13	0.00000	.17823E+00	0.00000	-.16535E-01	0.00000	-.15749E+00	0.00000	-.26191E-13	0.00000	-.94802E-14	0.00000
.68445E-13	0.00000	-.17823E+00	0.00000	-.16535E-01	0.00000	-.15749E+00	0.00000	-.65467E-13	0.00000	-.31817E-14	0.00000
.61767E-13	0.00000	.88189E-01	0.00000	-.17327E+00	0.00000	.23950E-02	0.00000	.33323E-13	0.00000	.11416E-14	0.00000
.36455E-13	0.00000	-.88189E-01	0.00000	-.17327E+00	0.00000	.23950E-02	0.00000	.35655E-13	0.00000	.49189E-13	0.00000
.21563E-13	0.00000	.22932E-12	0.00000	.17245E+00	0.00000	-.41417E-13	0.00000	-.24818E-13	0.00000	.23831E-13	0.00000
.47630E-13	0.00000	-.16695E-12	0.00000	.17245E+00	0.00000						
.24417E-13	0.00000	.24450E-12	0.00000	.17245E+00	0.00000						
.66018E-13	0.00000	-.16661E-12	0.00000	.17245E+00	0.00000	-.37322E-13	0.00000	-.46782E-13	0.00000	-.58848E-13	0.00000
.98007E-14	0.00000	-.88189E-01	0.00000	-.17327E+00	0.00000	-.23950E-02	0.00000	-.30201E-13	0.00000	.51643E-14	0.00000
.74814E-13	0.00000	.88189E-01	0.00000	-.17327E+00	0.00000	-.23950E-02	0.00000	-.25026E-13	0.00000	.48670E-13	0.00000
.51493E-14	0.00000	-.17823E+00	0.00000	-.16535E-01	0.00000	.15749E+00	0.00000	.29396E-13	0.00000	.69900E-14	0.00000
-.11416E-12	0.00000	.17823E+00	0.00000	-.16535E-01	0.00000	.15749E+00	0.00000	.53379E-13	0.00000	.79246E-14	0.00000
-.11197E-13	0.00000	-.16471E+00	0.00000	.20868E+00	0.00000	.33167E-01	0.00000	-.70142E-13	0.00000	-.15440E-13	0.00000
.43522E-13	0.00000	.16471E+00	0.00000	.20868E+00	0.00000	.33167E-01	0.00000	-.81479E-14	0.00000	-.10488E-13	0.00000
.22346E-13	0.00000	-.12978E+00	0.00000	-.19132E+00	0.00000	-.52269E-01	0.00000	-.56598E-13	0.00000	.43922E-13	0.00000
.18181E-13	0.00000	.12978E+00	0.00000	-.19132E+00	0.00000	-.52269E-01	0.00000	.27089E-13	0.00000	.60404E-13	0.00000

NATURAL FREQUENCY= .767238E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.11308E+00	0.00000	-.32015E-13	0.00000	-.18766E-13	0.00000	.36119E-13	0.00000	-.78689E-01	0.00000	-.17268E+00	0.00000
-.11308E+00	0.00000	.97524E-14	0.00000	-.30934E-13	0.00000	.30607E-13	0.00000	-.78689E-01	0.00000	.17268E+00	0.00000
.23163E+00	0.00000	.12489E-13	0.00000	.45918E-13	0.00000	-.12916E-14	0.00000	.18184E+00	0.00000	-.94522E-02	0.00000
-.23163E+00	0.00000	-.37030E-13	0.00000	.56303E-13	0.00000	.14118E-13	0.00000	.18184E+00	0.00000	.94522E-02	0.00000
-.75811E-01	0.00000	.29268E-13	0.00000	-.37198E-13	0.00000	-.14632E-13	0.00000	-.71851E-01	0.00000	.10514E+00	0.00000
.75811E-01	0.00000	-.38844E-13	0.00000	-.47540E-13	0.00000	.84735E-14	0.00000	-.71851E-01	0.00000	-.10514E+00	0.00000
-.19004E+00	0.00000	.37721E-13	0.00000	-.21797E-13	0.00000	.23529E-13	0.00000	-.16885E+00	0.00000	-.55475E-01	0.00000
.19004E+00	0.00000	-.34593E-13	0.00000	-.75973E-14	0.00000	.12411E-13	0.00000	-.16885E+00	0.00000	.55475E-01	0.00000
.14730E+00	0.00000	.59157E-13	0.00000	.44433E-13	0.00000	-.28104E-13	0.00000	.13755E+00	0.00000	.21577E-12	0.00000
-.14730E+00	0.00000	-.21924E-13	0.00000	.27808E-13	0.00000						
.14730E+00	0.00000	.57350E-13	0.00000	-.10584E-13	0.00000						
-.14730E+00	0.00000	-.22070E-13	0.00000	-.33941E-14	0.00000	-.16026E-13	0.00000	.13755E+00	0.00000	.13283E-12	0.00000
-.19004E+00	0.00000	.21263E-13	0.00000	-.68192E-14	0.00000	-.84157E-14	0.00000	-.16885E+00	0.00000	.55475E-01	0.00000
.19004E+00	0.00000	.15040E-13	0.00000	-.12516E-13	0.00000	-.50171E-14	0.00000	-.16885E+00	0.00000	-.55475E-01	0.00000
-.75811E-01	0.00000	-.10801E-13	0.00000	.52865E-13	0.00000	.91516E-14	0.00000	-.71851E-01	0.00000	-.10514E+00	0.00000
.75811E-01	0.00000	.15534E-13	0.00000	.52773E-13	0.00000	-.13597E-13	0.00000	-.71851E-01	0.00000	.10514E+00	0.00000
.23163E+00	0.00000	-.35744E-13	0.00000	-.41102E-14	0.00000	-.33846E-14	0.00000	.18184E+00	0.00000	.94522E-02	0.00000
-.23163E+00	0.00000	.21158E-13	0.00000	.46895E-14	0.00000	-.50943E-14	0.00000	.18184E+00	0.00000	-.94522E-02	0.00000
-.11308E+00	0.00000	-.63134E-13	0.00000	-.42735E-13	0.00000	.24294E-13	0.00000	-.78689E-01	0.00000	.17268E+00	0.00000
.11308E+00	0.00000	.32820E-13	0.00000	-.40233E-13	0.00000	.15650E-13	0.00000	-.78689E-01	0.00000	-.17268E+00	0.00000

NATURAL FREQUENCY= [illegible]

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.18955E-13	0.00000	-.20116E+00	0.00000	.43425E-01	0.00000	.17456E+00	0.00000	-.24274E-13	0.00000	.77071E-13	0.00000
-.33234E-13	0.00000	.20116E+00	0.00000	.43425E-01	0.00000	.17456E+00	0.00000	.46065E-13	0.00000	-.41094E-14	0.00000
-.44830E-13	0.00000	-.77023E-01	0.00000	.93062E-01	0.00000	-.32350E-01	0.00000	-.48307E-13	0.00000	-.24954E-13	0.00000
.17408E-13	0.00000	.77023E-01	0.00000	.93062E-01	0.00000	-.32350E-01	0.00000	-.65199E-13	0.00000	-.58574E-14	0.00000
.20204E-13	0.00000	.29088E-01	0.00000	-.26056E+00	0.00000	-.30303E-01	0.00000	.41781E-15	0.00000	-.23499E-13	0.00000
.63163E-13	0.00000	-.29088E-01	0.00000	-.26056E+00	0.00000	-.30303E-01	0.00000	.21108E-13	0.00000	.32219E-13	0.00000
.20903E-13	0.00000	.11390E+00	0.00000	.11908E-01	0.00000	.38266E-01	0.00000	.69331E-13	0.00000	.14233E-13	0.00000
-.91949E-13	0.00000	-.11390E+00	0.00000	.11908E-01	0.00000	.38266E-01	0.00000	.71464E-13	0.00000	-.11643E-13	0.00000
-.12395E-13	0.00000	.21905E+00	0.00000	.14465E+00	0.00000	-.14465E+00	0.00000	-.65093E-13	0.00000	.10226E-13	0.00000
.15843E-13	0.00000	-.21905E+00	0.00000	.14465E+00	0.00000						
-.20871E-13	0.00000	.21905E+00	0.00000	-.14465E+00	0.00000						
.99363E-13	0.00000	-.21905E+00	0.00000	-.14465E+00	0.00000	-.14465E+00	0.00000	-.46770E-13	0.00000	-.12516E-13	0.00000
.18775E-13	0.00000	.11390E+00	0.00000	-.11908E-01	0.00000	.38266E-01	0.00000	.41524E-13	0.00000	-.10328E-14	0.00000
-.96952E-13	0.00000	-.11390E+00	0.00000	-.11908E-01	0.00000	.38266E-01	0.00000	.46802E-13	0.00000	.44941E-13	0.00000
.25209E-13	0.00000	.29088E-01	0.00000	.26056E+00	0.00000	-.30303E-01	0.00000	.22445E-13	0.00000	.30612E-13	0.00000
-.23472E-13	0.00000	-.29088E-01	0.00000	.26056E+00	0.00000	-.30303E-01	0.00000	.29216E-13	0.00000	-.27887E-13	0.00000
-.75462E-13	0.00000	-.77023E-01	0.00000	-.93062E-01	0.00000	-.32350E-01	0.00000	-.64250E-13	0.00000	-.48469E-13	0.00000
.97503E-13	0.00000	.77023E-01	0.00000	-.93062E-01	0.00000	-.32350E-01	0.00000	-.51687E-13	0.00000	.97409E-14	0.00000
.29726E-13	0.00000	-.20116E+00	0.00000	-.43425E-01	0.00000	.17456E+00	0.00000	-.95853E-15	0.00000	-.62230E-13	0.00000
-.40148E-13	0.00000	.20116E+00	0.00000	-.43425E-01	0.00000	.17456E+00	0.00000	.15212E-13	0.00000	.52667E-13	0.00000

NATURAL FREQUENCY= .91741IE+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.64013E-01	0.00000	.52910E-13	0.00000	-.63914E-13	0.00000	.63021E-13	0.00000	.32672E-01	0.00000	.18152E+00	0.00000
-.64013E-01	0.00000	-.54168E-13	0.00000	-.64139E-13	0.00000	-.43817E-13	0.00000	.32672E-01	0.00000	-.18152E+00	0.00000
-.19244E+00	0.00000	.67584E-13	0.00000	.13099E-12	0.00000	-.11365E-13	0.00000	-.15431E+00	0.00000	-.49635E-01	0.00000
.19244E+00	0.00000	-.59661E-13	0.00000	.59608E-13	0.00000	-.53777E-13	0.00000	-.15431E+00	0.00000	.49635E-01	0.00000
.23516E+00	0.00000	.26722E-13	0.00000	-.99880E-13	0.00000	-.30047E-13	0.00000	.21671E+00	0.00000	-.15861E-01	0.00000
-.23516E+00	0.00000	-.58134E-13	0.00000	-.67232E-13	0.00000	-.32795E-13	0.00000	.21671E+00	0.00000	.15861E-01	0.00000
-.13778E+00	0.00000	-.26199E-13	0.00000	.64851E-14	0.00000	.40561E-13	0.00000	-.92067E-01	0.00000	.99898E-01	0.00000
.13778E+00	0.00000	-.12028E-13	0.00000	.27777E-13	0.00000	.34806E-13	0.00000	-.92067E-01	0.00000	-.99898E-01	0.00000
-.10748E+00	0.00000	-.18432E-13	0.00000	.50613E-13	0.00000	-.20899E-13	0.00000	.50064E-13	0.00000	-.10748E+00	0.00000
.10748E+00	0.00000	.27049E-13	0.00000	.48549E-13	0.00000						
.10748E+00	0.00000	-.25896E-13	0.00000	.10137E-13	0.00000						
-.10748E+00	0.00000	.27084E-13	0.00000	.18616E-13	0.00000	-.19383E-13	0.00000	-.10728E-12	0.00000	.10748E+00	0.00000
.13778E+00	0.00000	-.22444E-13	0.00000	-.49826E-13	0.00000	.28870E-13	0.00000	.92067E-01	0.00000	.99898E-01	0.00000
-.13778E+00	0.00000	.48449E-13	0.00000	-.41048E-13	0.00000	.37135E-13	0.00000	.92067E-01	0.00000	-.99898E-01	0.00000
-.23516E+00	0.00000	-.16965E-14	0.00000	.40910E-13	0.00000	.11134E-13	0.00000	-.21671E+00	0.00000	-.15861E-01	0.00000
.23516E+00	0.00000	.33215E-13	0.00000	.40696E-13	0.00000	.15375E-13	0.00000	-.21671E+00	0.00000	.15861E-01	0.00000
.19244E+00	0.00000	.99330E-15	0.00000	-.31820E-13	0.00000	-.20011E-13	0.00000	.15431E+00	0.00000	-.49635E-01	0.00000
-.19244E+00	0.00000	-.11122E-13	0.00000	-.31241E-13	0.00000	-.96338E-14	0.00000	.15431E+00	0.00000	.49635E-01	0.00000
-.64013E-01	0.00000	-.21933E-14	0.00000	.15524E-14	0.00000	.24804E-14	0.00000	-.32672E-01	0.00000	.18152E+00	0.00000
.64013E-01	0.00000	-.20656E-13	0.00000	.45732E-14	0.00000	-.25632E-14	0.00000	-.32672E-01	0.00000	-.18152E+00	0.00000

NATURAL FREQUENCY= .916203E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.36878E-01	0.00000	.13594E-12	0.00000	-.14130E-13	0.00000	-.31553E-13	0.00000	.37110E-11	0.00000	-.24507E+00	0.00000
.36878E-01	0.00000	-.45652E-13	0.00000	-.31286E-13	0.00000	.14528E-13	0.00000	.41584E-11	0.00000	-.24507E+00	0.00000
.53519E-01	0.00000	.29100E-13	0.00000	.25568E-13	0.00000	-.97411E-14	0.00000	-.18871E-10	0.00000	.12083E+00	0.00000
.53519E-01	0.00000	-.82254E-13	0.00000	.99554E-13	0.00000	-.29680E-13	0.00000	-.18411E-10	0.00000	.12083E+00	0.00000
-.21665E+00	0.00000	-.80229E-13	0.00000	-.25457E-13	0.00000	-.11255E-13	0.00000	.26056E-10	0.00000	-.11441E+00	0.00000
-.21665E+00	0.00000	-.69860E-13	0.00000	-.88410E-13	0.00000	.15476E-13	0.00000	.26406E-10	0.00000	-.11441E+00	0.00000
.29143E+00	0.00000	-.10095E-12	0.00000	.63461E-13	0.00000	.28229E-13	0.00000	-.11289E-10	0.00000	-.25318E-01	0.00000
.29143E+00	0.00000	-.29064E-14	0.00000	.45571E-13	0.00000	.32188E-13	0.00000	-.11061E-10	0.00000	-.25318E-01	0.00000
-.16518E+00	0.00000	-.43208E-13	0.00000	.21087E-14	0.00000	-.59169E-14	0.00000	-.18784E-13	0.00000	-.13025E-10	0.00000
-.16518E+00	0.00000	.55891E-13	0.00000	-.50784E-14	0.00000						
-.16518E+00	0.00000	-.42097E-13	0.00000	-.80237E-14	0.00000						
-.16518E+00	0.00000	.53184E-13	0.00000	-.62926E-14	0.00000	-.20317E-14	0.00000	.12487E-12	0.00000	.12977E-10	0.00000
.29143E+00	0.00000	-.24312E-14	0.00000	-.40161E-14	0.00000	.35762E-13	0.00000	.11008E-10	0.00000	.25318E-01	0.00000
.29143E+00	0.00000	.12060E-12	0.00000	-.16585E-13	0.00000	.28098E-13	0.00000	.11115E-10	0.00000	.25318E-01	0.00000
-.21665E+00	0.00000	.22365E-13	0.00000	.40669E-13	0.00000	.11705E-13	0.00000	-.26224E-10	0.00000	.11441E+00	0.00000
-.21665E+00	0.00000	.87735E-13	0.00000	.35495E-13	0.00000	-.12644E-13	0.00000	-.26146E-10	0.00000	.11441E+00	0.00000
.53519E-01	0.00000	-.94261E-14	0.00000	-.47854E-13	0.00000	.19238E-13	0.00000	.18620E-10	0.00000	-.12083E+00	0.00000
.53519E-01	0.00000	.16745E-13	0.00000	-.51742E-13	0.00000	-.40007E-14	0.00000	.18703E-10	0.00000	-.12083E+00	0.00000
.36878E-01	0.00000	-.69485E-13	0.00000	.63753E-14	0.00000	.33882E-13	0.00000	-.39824E-11	0.00000	.24507E+00	0.00000
.36878E-01	0.00000	-.38617E-13	0.00000	.22056E-13	0.00000	.21267E-13	0.00000	-.39118E-11	0.00000	.24507E+00	0.00000

NATURAL FREQUENCY= .929122E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.25537E-13	0.00000	.15613E+00	0.00000	-.14467E+00	0.00000	.43207E-01	0.00000	.24626E-11	0.00000	.10965E-13	0.00000
.19993E-13	0.00000	-.15613E+00	0.00000	-.14467E+00	0.00000	.43207E-01	0.00000	-.24714E-11	0.00000	.72808E-13	0.00000
.48536E-13	0.00000	.13307E+00	0.00000	.25504E+00	0.00000	-.77583E-01	0.00000	.25407E-11	0.00000	.33072E-13	0.00000
-.22808E-13	0.00000	-.13307E+00	0.00000	.25504E+00	0.00000	-.77583E-01	0.00000	-.24421E-11	0.00000	.14765E-13	0.00000
-.68464E-13	0.00000	.14734E-01	0.00000	-.19025E+00	0.00000	-.36558E-01	0.00000	.23910E-11	0.00000	-.10437E-13	0.00000
.34598E-13	0.00000	-.14734E-01	0.00000	-.19025E+00	0.00000	-.36558E-01	0.00000	-.24713E-11	0.00000	-.24754E-13	0.00000
.39059E-13	0.00000	-.13263E+00	0.00000	.13724E+00	0.00000	.12436E+00	0.00000	.23610E-11	0.00000	-.24056E-13	0.00000
-.24268E-13	0.00000	.13263E+00	0.00000	.13724E+00	0.00000	.12436E+00	0.00000	-.22976E-11	0.00000	.22687E-13	0.00000
.22414E-13	0.00000	-.15396E+00	0.00000	.44750E-01	0.00000	-.44750E-01	0.00000	.22319E-11	0.00000	.25230E-13	0.00000
-.18798E-13	0.00000	.15396E+00	0.00000	.44750E-01	0.00000						
-.31239E-13	0.00000	-.15396E+00	0.00000	-.44750E-01	0.00000						
.29851E-13	0.00000	.15396E+00	0.00000	-.44750E-01	0.00000	-.44750E-01	0.00000	-.22658E-11	0.00000	-.32847E-13	0.00000
-.15246E-13	0.00000	-.13263E+00	0.00000	-.13724E+00	0.00000	.12436E+00	0.00000	.22212E-11	0.00000	-.34446E-13	0.00000
-.69185E-14	0.00000	.13263E+00	0.00000	-.13724E+00	0.00000	.12436E+00	0.00000	-.22612E-11	0.00000	.15442E-13	0.00000
.44014E-13	0.00000	.14734E-01	0.00000	.19025E+00	0.00000	-.36558E-01	0.00000	.22067E-11	0.00000	.18000E-13	0.00000
-.16429E-13	0.00000	-.14734E-01	0.00000	.19025E+00	0.00000	-.36558E-01	0.00000	-.21759E-11	0.00000	-.98461E-14	0.00000
-.36408E-13	0.00000	.13307E+00	0.00000	-.25504E+00	0.00000	-.77583E-01	0.00000	.21562E-11	0.00000	-.31778E-13	0.00000
.23596E-13	0.00000	-.13307E+00	0.00000	-.25504E+00	0.00000	-.77583E-01	0.00000	-.21852E-11	0.00000	-.28948E-15	0.00000
.26410E-13	0.00000	.15613E+00	0.00000	.14467E+00	0.00000	.43207E-01	0.00000	.20955E-11	0.00000	-.14032E-13	0.00000
.17920E-13	0.00000	-.15613E+00	0.00000	.14467E+00	0.00000	.43207E-01	0.00000	-.20513E-11	0.00000	.22694E-13	0.00000

NATURAL FREQUENCY= .933079E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.18031E-14	0.00000	.11655E+00	0.00000	.14660E-11	0.00000	-.48202E-12	0.00000	.22410E+00	0.00000	-.18041E-12	0.00000
.20763E-13	0.00000	.11655E+00	0.00000	.14782E-11	0.00000	-.47013E-12	0.00000	-.22410E+00	0.00000	-.84694E-13	0.00000
.70526E-13	0.00000	-.13543E-11	0.00000	-.26240E-11	0.00000	.81035E-12	0.00000	.22410E+00	0.00000	.51997E-13	0.00000
-.23068E-13	0.00000	.13840E-11	0.00000	-.26455E-11	0.00000	.80127E-12	0.00000	-.22410E+00	0.00000	.69835E-13	0.00000
-.15486E-12	0.00000	-.11655E+00	0.00000	.20203E-11	0.00000	.36692E-12	0.00000	.22410E+00	0.00000	-.59732E-13	0.00000
-.68243E-13	0.00000	-.11655E+00	0.00000	.20018E-11	0.00000	.37558E-12	0.00000	-.22410E+00	0.00000	-.55083E-13	0.00000
.17151E-12	0.00000	-.11655E+00	0.00000	-.15261E-11	0.00000	-.12412E-11	0.00000	.22410E+00	0.00000	-.27685E-13	0.00000
.14278E-12	0.00000	-.11655E+00	0.00000	-.15046E-11	0.00000	-.12550E-11	0.00000	-.22410E+00	0.00000	.32127E-14	0.00000
-.61144E-13	0.00000	.15617E-11	0.00000	-.34839E-12	0.00000	.43232E-12	0.00000	.22410E+00	0.00000	.20165E-13	0.00000
-.14537E-12	0.00000	-.16024E-11	0.00000	-.37052E-12	0.00000						
-.11871E-12	0.00000	.15383E-11	0.00000	.55019E-12	0.00000						
-.72953E-13	0.00000	-.15990E-11	0.00000	.50027E-12	0.00000	.43216E-12	0.00000	-.22410E+00	0.00000	-.53874E-14	0.00000
.11032E-12	0.00000	.11655E+00	0.00000	.12470E-11	0.00000	-.12732E-11	0.00000	.22410E+00	0.00000	-.29335E-13	0.00000
.17733E-12	0.00000	.11655E+00	0.00000	.12189E-11	0.00000	-.12519E-11	0.00000	-.22410E+00	0.00000	.40237E-13	0.00000
-.32526E-13	0.00000	.11655E+00	0.00000	-.17810E-11	0.00000	.40054E-12	0.00000	.22410E+00	0.00000	.65477E-13	0.00000
-.20021E-12	0.00000	.11655E+00	0.00000	-.17888E-11	0.00000	.40035E-12	0.00000	-.22410E+00	0.00000	.67685E-13	0.00000
-.28044E-13	0.00000	-.13132E-11	0.00000	.25210E-11	0.00000	.74281E-12	0.00000	.22410E+00	0.00000	-.56392E-13	0.00000
.81358E-13	0.00000	.13174E-11	0.00000	.24854E-11	0.00000	.75208E-12	0.00000	-.22410E+00	0.00000	-.89748E-13	0.00000
.34768E-13	0.00000	-.11655E+00	0.00000	-.14659E-11	0.00000	-.39027E-12	0.00000	.22410E+00	0.00000	.60282E-13	0.00000
-.12352E-14	0.00000	-.11655E+00	0.00000	-.14414E-11	0.00000	-.33718E-12	0.00000	-.22410E+00	0.00000	.21298E-12	0.00000

NATURAL FREQUENCY= .974914E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.32308E-13	0.00000	-.17756E-01	0.00000	-.50200E-01	0.00000	.12920E+00	0.00000	-.14072E-11	0.00000	.35455E-14	0.00000
-.33464E-14	0.00000	.17756E-01	0.00000	-.50200E-01	0.00000	.12920E+00	0.00000	.14348E-11	0.00000	.85377E-13	0.00000
.20393E-13	0.00000	.75281E-01	0.00000	.14850E+00	0.00000	-.96335E-01	0.00000	-.10313E-11	0.00000	.49102E-14	0.00000
-.32785E-13	0.00000	-.75281E-01	0.00000	.14850E+00	0.00000	-.96335E-01	0.00000	.10937E-11	0.00000	.30581E-15	0.00000
-.61563E-13	0.00000	.72219E-01	0.00000	-.26832E+00	0.00000	.42460E-02	0.00000	-.50028E-12	0.00000	.40195E-14	0.00000
.62975E-13	0.00000	-.72219E-01	0.00000	-.26832E+00	0.00000	.42460E-02	0.00000	.43033E-12	0.00000	.99300E-14	0.00000
.21388E-13	0.00000	.40855E-01	0.00000	.30987E+00	0.00000	.12268E-01	0.00000	.27982E-12	0.00000	-.15888E-13	0.00000
-.65871E-13	0.00000	-.40855E-01	0.00000	.30987E+00	0.00000	.12268E-01	0.00000	-.14818E-12	0.00000	.11959E-13	0.00000
.88182E-14	0.00000	-.10203E-12	0.00000	-.13984E+00	0.00000	-.60918E-13	0.00000	.75595E-12	0.00000	.21765E-14	0.00000
.15105E-14	0.00000	.10904E-12	0.00000	-.13984E+00	0.00000						
-.42204E-13	0.00000	-.71252E-13	0.00000	-.13984E+00	0.00000						
.34422E-13	0.00000	.11132E-12	0.00000	-.13984E+00	0.00000	-.59199E-13	0.00000	-.81721E-12	0.00000	-.42997E-14	0.00000
.27929E-13	0.00000	-.40855E-01	0.00000	.30987E+00	0.00000	-.12268E-01	0.00000	.90395E-12	0.00000	-.93193E-14	0.00000
-.27391E-13	0.00000	.40855E-01	0.00000	.30987E+00	0.00000	-.12268E-01	0.00000	-.85154E-12	0.00000	.13436E-13	0.00000
-.95509E-14	0.00000	-.72219E-01	0.00000	-.26832E+00	0.00000	-.42460E-02	0.00000	.67664E-12	0.00000	-.11928E-13	0.00000
.82660E-14	0.00000	.72219E-01	0.00000	-.26832E+00	0.00000	-.42460E-02	0.00000	-.69337E-12	0.00000	-.19069E-14	0.00000
.81757E-14	0.00000	-.75281E-01	0.00000	.14850E+00	0.00000	.96335E-01	0.00000	.31369E-12	0.00000	-.42301E-13	0.00000
.66758E-14	0.00000	.75281E-01	0.00000	.14850E+00	0.00000	.96335E-01	0.00000	-.32721E-12	0.00000	.21593E-13	0.00000
.12546E-14	0.00000	.17756E-01	0.00000	-.50200E-01	0.00000	-.12920E+00	0.00000	.24513E-13	0.00000	.32875E-13	0.00000
.36711E-14	0.00000	-.17756E-01	0.00000	-.50200E-01	0.00000	-.12920E+00	0.00000	-.60261E-14	0.00000	-.56336E-13	0.00000

NATURAL FREQUENCY= .951748E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.33787E-14	0.00000	.38745E-12	0.00000	-.14908E-12	0.00000	-.10414E-12	0.00000	-.32827E+00	0.00000	.49106E-13	0.00000
.20184E-13	0.00000	-.17469E-12	0.00000	-.18040E-12	0.00000	-.11318E-12	0.00000	.32827E+00	0.00000	-.42276E-13	0.00000
-.46318E-13	0.00000	.10657E-12	0.00000	.17541E-12	0.00000	.32428E-13	0.00000	-.28868E+00	0.00000	.17621E-13	0.00000
.45363E-15	0.00000	-.91839E-13	0.00000	.20533E-12	0.00000	.41153E-13	0.00000	.28868E+00	0.00000	-.30043E-13	0.00000
.76042E-14	0.00000	-.17148E-12	0.00000	.12697E-12	0.00000	-.62074E-13	0.00000	-.21426E+00	0.00000	.10780E-13	0.00000
.12658E-13	0.00000	-.46559E-13	0.00000	.15036E-12	0.00000	-.83831E-13	0.00000	.21426E+00	0.00000	-.12958E-13	0.00000
-.41488E-13	0.00000	-.32077E-12	0.00000	-.30979E-12	0.00000	.12088E-12	0.00000	-.11401E+00	0.00000	.38081E-14	0.00000
-.65023E-13	0.00000	.11834E-12	0.00000	-.32152E-12	0.00000	.12376E-12	0.00000	.11401E+00	0.00000	.15896E-13	0.00000
-.17561E-13	0.00000	-.27627E-12	0.00000	.26990E-12	0.00000	-.64650E-13	0.00000	-.47829E-12	0.00000	-.22492E-13	0.00000
.48473E-13	0.00000	.19837E-12	0.00000	.28276E-12	0.00000						
.94414E-14	0.00000	-.26032E-12	0.00000	.15665E-12	0.00000						
.28840E-13	0.00000	.20701E-12	0.00000	.16147E-12	0.00000	-.52723E-13	0.00000	.49380E-12	0.00000	-.13360E-13	0.00000
-.35076E-13	0.00000	-.36150E-13	0.00000	-.68740E-12	0.00000	.23498E-12	0.00000	.11401E+00	0.00000	-.45458E-14	0.00000
-.31091E-13	0.00000	.31008E-12	0.00000	-.72934E-12	0.00000	.24010E-12	0.00000	-.11401E+00	0.00000	-.13109E-13	0.00000
-.13441E-13	0.00000	.28679E-12	0.00000	.70706E-12	0.00000	-.74463E-13	0.00000	.21426E+00	0.00000	.18155E-14	0.00000
.59411E-13	0.00000	.34876E-13	0.00000	.71237E-12	0.00000	-.47518E-13	0.00000	-.21426E+00	0.00000	-.19740E-14	0.00000
.18595E-13	0.00000	.32947E-12	0.00000	-.62860E-12	0.00000	-.25613E-12	0.00000	.28868E+00	0.00000	.46572E-14	0.00000
-.59672E-13	0.00000	-.31440E-12	0.00000	-.60765E-12	0.00000	-.28194E-12	0.00000	-.28868E+00	0.00000	.13706E-13	0.00000
.10981E-13	0.00000	.64720E-13	0.00000	.32299E-12	0.00000	.22906E-12	0.00000	.32827E+00	0.00000	.11790E-13	0.00000
-.12213E-13	0.00000	-.35295E-12	0.00000	.30117E-12	0.00000	.27683E-12	0.00000	-.32827E+00	0.00000	-.51965E-13	0.00000

NATURAL FREQUENCY= .984405E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.39211E-01	0.00000	.31412E-13	0.00000	-.19891E-13	0.00000	-.11846E-12	0.00000	-.10720E-01	0.00000	-.15229E+00	0.00000
.39211E-01	0.00000	-.25223E-13	0.00000	-.44596E-13	0.00000	-.50544E-13	0.00000	-.10720E-01	0.00000	.15229E+00	0.00000
.13113E+00	0.00000	-.45116E-13	0.00000	-.38010E-13	0.00000	.41951E-13	0.00000	.10918E+00	0.00000	.57038E-01	0.00000
-.13113E+00	0.00000	.16734E-13	0.00000	.29910E-13	0.00000	.23436E-13	0.00000	.10918E+00	0.00000	-.57038E-01	0.00000
-.21898E+00	0.00000	-.17311E-13	0.00000	.58173E-13	0.00000	.44447E-13	0.00000	-.19851E+00	0.00000	-.29611E-01	0.00000
.21898E+00	0.00000	.22459E-13	0.00000	.39213E-13	0.00000	.42594E-13	0.00000	-.19851E+00	0.00000	.29611E-01	0.00000
.22378E+00	0.00000	-.10532E-13	0.00000	-.52075E-13	0.00000	-.85129E-15	0.00000	.21374E+00	0.00000	-.39217E-01	0.00000
-.22378E+00	0.00000	-.12981E-13	0.00000	-.28394E-13	0.00000	-.23216E-14	0.00000	.21374E+00	0.00000	.39217E-01	0.00000
-.96721E-01	0.00000	.26302E-14	0.00000	.18896E-13	0.00000	-.82587E-14	0.00000	-.11370E+00	0.00000	.45981E-13	0.00000
.96721E-01	0.00000	.46297E-14	0.00000	-.32928E-14	0.00000						
-.96721E-01	0.00000	.20687E-14	0.00000	.78514E-15	0.00000						
.96721E-01	0.00000	.62946E-14	0.00000	.18599E-13	0.00000	.56100E-14	0.00000	-.11370E+00	0.00000	.59141E-13	0.00000
.22378E+00	0.00000	.52071E-13	0.00000	.27928E-14	0.00000	-.40377E-13	0.00000	.21374E+00	0.00000	.39217E-01	0.00000
-.22378E+00	0.00000	-.11610E-13	0.00000	-.97341E-14	0.00000	-.94659E-15	0.00000	.21374E+00	0.00000	-.39217E-01	0.00000
-.21898E+00	0.00000	.49993E-13	0.00000	.25264E-13	0.00000	.81645E-14	0.00000	-.19851E+00	0.00000	.29611E-01	0.00000
.21898E+00	0.00000	-.46232E-14	0.00000	.21651E-13	0.00000	-.65678E-15	0.00000	-.19851E+00	0.00000	-.29611E-01	0.00000
.13113E+00	0.00000	.30545E-14	0.00000	-.10324E-13	0.00000	.32771E-14	0.00000	.10918E+00	0.00000	-.57038E-01	0.00000
-.13113E+00	0.00000	-.15510E-13	0.00000	-.15819E-13	0.00000	-.80377E-14	0.00000	.10918E+00	0.00000	.57038E-01	0.00000
-.39211E-01	0.00000	-.34630E-13	0.00000	-.11519E-13	0.00000	.16496E-13	0.00000	-.10720E-01	0.00000	.15229E+00	0.00000
.39211E-01	0.00000	-.80061E-14	0.00000	.64394E-14	0.00000	.86674E-14	0.00000	-.10720E-01	0.00000	-.15229E+00	0.00000

NATURAL FREQUENCY= .104499E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.81345E-01	0.00000	.58101E-13	0.00000	-.30729E-13	0.00000	-.23973E-13	0.00000	-.35101E-13	0.00000	.27086E+00	0.00000
-.81345E-01	0.00000	-.75905E-13	0.00000	-.20447E-14	0.00000	-.85623E-13	0.00000	.27719E-13	0.00000	.27086E+00	0.00000
.59051E-01	0.00000	-.96510E-14	0.00000	.52400E-13	0.00000	.53475E-13	0.00000	-.85180E-13	0.00000	-.10252E+00	0.00000
.59051E-01	0.00000	.60655E-13	0.00000	-.24874E-13	0.00000	.24960E-13	0.00000	-.97394E-13	0.00000	-.10252E+00	0.00000
.74947E-01	0.00000	-.80951E-13	0.00000	.26744E-13	0.00000	.49821E-13	0.00000	.22243E-12	0.00000	.17124E+00	0.00000
.74947E-01	0.00000	.97379E-13	0.00000	.17050E-13	0.00000	.52680E-13	0.00000	.23111E-12	0.00000	.17124E+00	0.00000
-.19734E+00	0.00000	-.92364E-13	0.00000	-.52385E-14	0.00000	.27723E-13	0.00000	-.21546E-12	0.00000	-.98791E-01	0.00000
-.19734E+00	0.00000	.37791E-13	0.00000	.68105E-14	0.00000	.43696E-13	0.00000	-.21683E-12	0.00000	-.98791E-01	0.00000
.22530E+00	0.00000	-.24784E-13	0.00000	-.20450E-13	0.00000	.12730E-14	0.00000	.12191E-12	0.00000	.22530E+00	0.00000
.22530E+00	0.00000	-.16094E-13	0.00000	-.28893E-13	0.00000						
-.22530E+00	0.00000	-.24199E-13	0.00000	-.18866E-13	0.00000						
-.22530E+00	0.00000	-.18709E-13	0.00000	-.27505E-13	0.00000	.89510E-15	0.00000	.11045E-12	0.00000	.22530E+00	0.00000
.19734E+00	0.00000	.59086E-13	0.00000	.35425E-13	0.00000	-.19302E-13	0.00000	-.21993E-12	0.00000	-.98791E-01	0.00000
.19734E+00	0.00000	-.48618E-13	0.00000	.23874E-13	0.00000	-.48585E-13	0.00000	-.22478E-12	0.00000	-.98791E-01	0.00000
-.74947E-01	0.00000	.87243E-13	0.00000	-.27022E-13	0.00000	-.21615E-13	0.00000	.18834E-12	0.00000	.17124E+00	0.00000
-.74947E-01	0.00000	-.10146E-13	0.00000	.55665E-16	0.00000	-.16958E-13	0.00000	.19126E-12	0.00000	.17124E+00	0.00000
-.59051E-01	0.00000	.12534E-13	0.00000	.31937E-13	0.00000	.30923E-14	0.00000	-.95697E-13	0.00000	-.10252E+00	0.00000
-.59051E-01	0.00000	.47091E-13	0.00000	.23341E-13	0.00000	.83404E-14	0.00000	-.98119E-13	0.00000	-.10252E+00	0.00000
.81345E-01	0.00000	-.10985E-12	0.00000	-.33773E-13	0.00000	.59901E-13	0.00000	.16801E-13	0.00000	.27086E+00	0.00000
.81345E-01	0.00000	.43982E-13	0.00000	-.23694E-13	0.00000	.54874E-13	0.00000	-.16042E-14	0.00000	.27086E+00	0.00000

NATURAL FREQUENCY= .990994E+03

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.15385E-13	0.00000	-.21928E-13	0.00000	.21010E-12	0.00000	-.40993E-12	0.00000	-.33231E+00	0.00000	.63292E-13	0.00000
-.26278E-14	0.00000	.97697E-14	0.00000	.16962E-12	0.00000	-.41041E-12	0.00000	.33231E+00	0.00000	-.64944E-13	0.00000
-.69849E-13	0.00000	-.26234E-12	0.00000	-.61083E-12	0.00000	.36965E-12	0.00000	-.20538E+00	0.00000	-.10610E-13	0.00000
.64807E-13	0.00000	.31681E-12	0.00000	-.56428E-12	0.00000	.38726E-12	0.00000	.20538E+00	0.00000	-.75939E-14	0.00000
.78852E-13	0.00000	-.16575E-12	0.00000	.10190E-11	0.00000	-.36469E-13	0.00000	-.29277E-12	0.00000	.16484E-14	0.00000
-.88854E-13	0.00000	.16578E-12	0.00000	.10347E-11	0.00000	-.81169E-13	0.00000	.40440E-12	0.00000	-.57956E-13	0.00000
-.10909E-12	0.00000	-.24089E-13	0.00000	-.10967E-11	0.00000	-.11895E-12	0.00000	.20538E+00	0.00000	-.23451E-13	0.00000
.53311E-13	0.00000	.21705E-13	0.00000	-.11101E-11	0.00000	-.11707E-12	0.00000	-.20538E+00	0.00000	-.14105E-13	0.00000
.74275E-13	0.00000	.41645E-13	0.00000	.49430E-12	0.00000	.19827E-13	0.00000	.33231E+00	0.00000	.22246E-13	0.00000
-.42135E-13	0.00000	-.61407E-13	0.00000	.50586E-12	0.00000						
.34726E-13	0.00000	.41856E-13	0.00000	.51255E-12	0.00000						
-.26521E-13	0.00000	-.25614E-13	0.00000	.52197E-12	0.00000	.83431E-14	0.00000	-.33231E+00	0.00000	-.18267E-13	0.00000
-.91021E-13	0.00000	.78620E-13	0.00000	-.11219E-11	0.00000	.80904E-13	0.00000	.20538E+00	0.00000	-.40369E-13	0.00000
.10629E-12	0.00000	-.84896E-13	0.00000	-.11012E-11	0.00000	.74132E-13	0.00000	-.20538E+00	0.00000	-.13441E-13	0.00000
.69570E-13	0.00000	.19366E-12	0.00000	.96412E-12	0.00000	.50007E-13	0.00000	.37941E-12	0.00000	-.26350E-13	0.00000
-.56114E-13	0.00000	-.16906E-12	0.00000	.97012E-12	0.00000	.41871E-13	0.00000	-.24022E-12	0.00000	.27134E-14	0.00000
-.43810E-13	0.00000	.26411E-12	0.00000	-.58556E-12	0.00000	-.32764E-12	0.00000	-.20538E+00	0.00000	.21044E-13	0.00000
.31786E-13	0.00000	-.26554E-12	0.00000	-.58951E-12	0.00000	-.34018E-12	0.00000	.20538E+00	0.00000	-.31932E-13	0.00000
.15610E-13	0.00000	-.15835E-13	0.00000	.21246E-12	0.00000	.41686E-12	0.00000	-.33231E+00	0.00000	-.98215E-13	0.00000
.11775E-13	0.00000	-.48398E-13	0.00000	.22808E-12	0.00000	.40439E-12	0.00000	.33231E+00	0.00000	.81971E-13	0.00000

NATURAL FREQUENCY= .107160E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.56861E-14	0.00000	-.23074E+00	0.00000	.96435E-01	0.00000	.13996E+00	0.00000	.24610E-11	0.00000	-.29942E-13	0.00000
-.54360E-14	0.00000	.23074E+00	0.00000	.96435E-01	0.00000	.13996E+00	0.00000	-.24419E-11	0.00000	-.11262E-13	0.00000
-.33731E-13	0.00000	.13598E-01	0.00000	-.17617E+00	0.00000	-.27662E-01	0.00000	.14095E-12	0.00000	-.45652E-13	0.00000
-.34975E-13	0.00000	-.13598E-01	0.00000	-.17617E+00	0.00000	-.27662E-01	0.00000	-.11359E-12	0.00000	-.59401E-13	0.00000
.21414E-13	0.00000	.23071E+00	0.00000	.30298E-01	0.00000	-.84102E-01	0.00000	-.22255E-11	0.00000	.28785E-14	0.00000
.99176E-13	0.00000	-.23071E+00	0.00000	.30298E-01	0.00000	-.84102E-01	0.00000	.23119E-11	0.00000	.43292E-13	0.00000
-.72166E-13	0.00000	.24042E+00	0.00000	.44101E-02	0.00000	-.13909E+00	0.00000	-.23216E-11	0.00000	-.48918E-13	0.00000
-.83557E-13	0.00000	-.24042E+00	0.00000	.44101E-02	0.00000	-.13909E+00	0.00000	.23931E-11	0.00000	-.28287E-13	0.00000
.77999E-13	0.00000	.10311E-12	0.00000	.45023E-01	0.00000	-.65937E-13	0.00000	-.21011E-12	0.00000	.72266E-13	0.00000
.62137E-13	0.00000	.98129E-14	0.00000	.45023E-01	0.00000						
-.57192E-13	0.00000	.99222E-13	0.00000	.45023E-01	0.00000						
-.37383E-13	0.00000	-.18964E-13	0.00000	.45023E-01	0.00000	-.29826E-13	0.00000	.18387E-12	0.00000	.64219E-13	0.00000
.55018E-13	0.00000	-.24042E+00	0.00000	.44101E-02	0.00000	.13909E+00	0.00000	.21584E-11	0.00000	-.14562E-13	0.00000
.36512E-13	0.00000	.24042E+00	0.00000	.44101E-02	0.00000	.13909E+00	0.00000	-.21211E-11	0.00000	-.35864E-13	0.00000
-.26916E-13	0.00000	-.23071E+00	0.00000	.30298E-01	0.00000	.84102E-01	0.00000	.22808E-11	0.00000	.76775E-13	0.00000
-.88570E-14	0.00000	.23071E+00	0.00000	.30298E-01	0.00000	.84102E-01	0.00000	-.22626E-11	0.00000	.90528E-13	0.00000
-.30740E-13	0.00000	-.13598E-01	0.00000	-.17617E+00	0.00000	.27662E-01	0.00000	.14024E-12	0.00000	-.22049E-13	0.00000
-.27105E-13	0.00000	.13598E-01	0.00000	-.17617E+00	0.00000	.27662E-01	0.00000	-.13532E-12	0.00000	-.10647E-13	0.00000
.23348E-13	0.00000	.23074E+00	0.00000	.96435E-01	0.00000	-.13996E+00	0.00000	-.20712E-11	0.00000	.12142E-12	0.00000
.27776E-13	0.00000	-.23074E+00	0.00000	.96435E-01	0.00000	-.13996E+00	0.00000	.20361E-11	0.00000	.92637E-13	0.00000

NATURAL FREQUENCY= .107813E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.42223E-13	0.00000	.21564E-11	0.00000	-.74956E-12	0.00000	-.11637E-11	0.00000	.28868E+00	0.00000	.48251E-13	0.00000
-.15830E-13	0.00000	-.15194E-11	0.00000	-.74492E-12	0.00000	-.12010E-11	0.00000	-.28868E+00	0.00000	.40522E-13	0.00000
.33831E-13	0.00000	-.26507E-12	0.00000	.13415E-11	0.00000	.25976E-12	0.00000	.34005E-13	0.00000	-.13504E-13	0.00000
.42539E-13	0.00000	.46078E-14	0.00000	.13098E-11	0.00000	.26613E-12	0.00000	-.33445E-13	0.00000	.35898E-13	0.00000
-.64889E-14	0.00000	-.22759E-11	0.00000	-.11747E-12	0.00000	.65320E-12	0.00000	-.28868E+00	0.00000	.95322E-14	0.00000
.17898E-13	0.00000	.14716E-11	0.00000	-.13809E-12	0.00000	.69931E-12	0.00000	.28868E+00	0.00000	.18489E-13	0.00000
-.49984E-14	0.00000	-.20656E-11	0.00000	-.18618E-12	0.00000	.10993E-11	0.00000	-.28868E+00	0.00000	-.75055E-13	0.00000
.47563E-13	0.00000	.18251E-11	0.00000	-.15667E-12	0.00000	.11138E-11	0.00000	.28868E+00	0.00000	-.47822E-13	0.00000
.35639E-13	0.00000	.33473E-12	0.00000	-.35741E-12	0.00000	.11484E-13	0.00000	-.14261E-12	0.00000	.21890E-13	0.00000
-.43336E-13	0.00000	.29554E-12	0.00000	-.30582E-12	0.00000						
.12777E-13	0.00000	.31628E-12	0.00000	-.32178E-12	0.00000						
.24953E-14	0.00000	.29348E-12	0.00000	-.27294E-12	0.00000	.83546E-14	0.00000	.10000E-12	0.00000	-.25778E-13	0.00000
.13296E-13	0.00000	.18651E-11	0.00000	-.14071E-12	0.00000	-.11493E-11	0.00000	.28868E+00	0.00000	-.23352E-14	0.00000
-.35394E-13	0.00000	-.21153E-11	0.00000	-.16197E-12	0.00000	-.11721E-11	0.00000	-.28868E+00	0.00000	-.15969E-13	0.00000
.17434E-13	0.00000	.14958E-11	0.00000	-.15693E-12	0.00000	-.65791E-12	0.00000	.28868E+00	0.00000	.27607E-13	0.00000
.15655E-13	0.00000	-.22563E-11	0.00000	-.17839E-12	0.00000	-.65916E-12	0.00000	-.28868E+00	0.00000	.12359E-13	0.00000
-.26975E-13	0.00000	-.54856E-15	0.00000	.14022E-11	0.00000	-.26284E-12	0.00000	.67637E-13	0.00000	-.12731E-13	0.00000
-.13956E-13	0.00000	-.21768E-12	0.00000	.13947E-11	0.00000	-.24176E-12	0.00000	-.10356E-12	0.00000	.70751E-14	0.00000
.26705E-13	0.00000	-.15469E-11	0.00000	-.77531E-12	0.00000	.11642E-11	0.00000	-.28868E+00	0.00000	.15480E-12	0.00000
.90968E-14	0.00000	.22175E-11	0.00000	-.77371E-12	0.00000	.11860E-11	0.00000	.28868E+00	0.00000	-.41137E-13	0.00000

NATURAL FREQUENCY= .109690E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.38222E-13	0.00000	-.25583E+00	0.00000	.10322E-12	0.00000	.69417E-13	0.00000	.44144E-12	0.00000	.98734E-14	0.00000
.70308E-14	0.00000	-.25583E+00	0.00000	.31525E-13	0.00000	.72460E-13	0.00000	-.55430E-12	0.00000	-.10299E-12	0.00000
-.10525E-13	0.00000	.97720E-01	0.00000	-.71625E-13	0.00000	-.33395E-13	0.00000	.12024E-12	0.00000	.48102E-13	0.00000
-.17322E-13	0.00000	.97720E-01	0.00000	-.13024E-12	0.00000	.24131E-14	0.00000	-.11273E-12	0.00000	.24797E-13	0.00000
-.24508E-13	0.00000	.31623E+00	0.00000	.29320E-14	0.00000	-.61891E-13	0.00000	-.29636E-12	0.00000	.72308E-14	0.00000
-.74115E-14	0.00000	.31623E+00	0.00000	.13930E-13	0.00000	-.27130E-13	0.00000	.38673E-12	0.00000	-.27570E-13	0.00000
.17193E-13	0.00000	.97720E-01	0.00000	.33464E-14	0.00000	-.86082E-13	0.00000	-.42696E-12	0.00000	.45090E-13	0.00000
.58835E-13	0.00000	.97720E-01	0.00000	.30949E-13	0.00000	-.72609E-13	0.00000	.47128E-12	0.00000	.64787E-13	0.00000
-.45928E-13	0.00000	-.25583E+00	0.00000	-.12175E-13	0.00000	.21505E-13	0.00000	-.11085E-12	0.00000	-.56443E-13	0.00000
-.32980E-13	0.00000	-.25583E+00	0.00000	.25793E-13	0.00000						
.28467E-13	0.00000	-.25583E+00	0.00000	.19193E-13	0.00000						
.80953E-13	0.00000	-.25583E+00	0.00000	.53481E-13	0.00000	.23478E-13	0.00000	.15946E-12	0.00000	-.34055E-13	0.00000
-.73242E-13	0.00000	.97720E-01	0.00000	-.85400E-14	0.00000	.70659E-13	0.00000	.55980E-12	0.00000	.52619E-13	0.00000
.34350E-15	0.00000	.97720E-01	0.00000	.21542E-14	0.00000	.61083E-13	0.00000	-.45890E-12	0.00000	.23637E-14	0.00000
-.16350E-13	0.00000	.31623E+00	0.00000	-.94499E-14	0.00000	.40668E-13	0.00000	.70116E-12	0.00000	-.73826E-13	0.00000
.54857E-13	0.00000	.31623E+00	0.00000	-.10845E-13	0.00000	.39042E-13	0.00000	-.51848E-12	0.00000	-.43388E-13	0.00000
-.60926E-13	0.00000	.97720E-01	0.00000	-.36558E-13	0.00000	-.22106E-14	0.00000	.73815E-13	0.00000	.26366E-13	0.00000
-.35464E-15	0.00000	.97720E-01	0.00000	-.47199E-13	0.00000	.12238E-14	0.00000	.61104E-13	0.00000	.69663E-13	0.00000
-.12726E-13	0.00000	-.25583E+00	0.00000	.19614E-13	0.00000	-.54751E-13	0.00000	-.59940E-12	0.00000	-.42266E-14	0.00000
.32207E-13	0.00000	-.25583E+00	0.00000	.33745E-13	0.00000	-.78366E-13	0.00000	.61199E-12	0.00000	.57627E-13	0.00000

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NATURAL FREQUENCY= .112863E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.20107E-13	0.00000	.24124E-11	0.00000	-.78627E-12	0.00000	-.29558E-11	0.00000	.27911E+00	0.00000	.29537E-13	0.00000
-.92558E-13	0.00000	-.27472E-11	0.00000	-.73965E-12	0.00000	-.29741E-11	0.00000	-.27911E+00	0.00000	.18610E-12	0.00000
.10897E-12	0.00000	-.13782E-11	0.00000	.12044E-11	0.00000	.16305E-11	0.00000	-.10661E+00	0.00000	.15729E-13	0.00000
.47406E-13	0.00000	.15160E-11	0.00000	.12184E-11	0.00000	.16002E-11	0.00000	.10661E+00	0.00000	.24829E-13	0.00000
-.40872E-14	0.00000	-.30478E-11	0.00000	.13092E-11	0.00000	.43305E-12	0.00000	-.34499E+00	0.00000	-.30083E-13	0.00000
-.39416E-13	0.00000	.34348E-11	0.00000	.12786E-11	0.00000	.45726E-12	0.00000	.34499E+00	0.00000	-.78503E-14	0.00000
.44943E-13	0.00000	-.21045E-11	0.00000	-.39289E-11	0.00000	.22350E-11	0.00000	-.10661E+00	0.00000	.41407E-13	0.00000
.17233E-13	0.00000	.21881E-11	0.00000	-.39361E-11	0.00000	.22253E-11	0.00000	.10661E+00	0.00000	-.58525E-14	0.00000
-.18362E-13	0.00000	.20230E-11	0.00000	.39066E-11	0.00000	-.39436E-11	0.00000	.27911E+00	0.00000	-.33798E-13	0.00000
-.14785E-13	0.00000	-.22943E-11	0.00000	.39133E-11	0.00000						
.73766E-13	0.00000	.20316E-11	0.00000	-.39580E-11	0.00000						
-.89417E-13	0.00000	-.22997E-11	0.00000	-.39674E-11	0.00000	-.39563E-11	0.00000	-.27911E+00	0.00000	.24115E-13	0.00000
.35931E-13	0.00000	-.21342E-11	0.00000	.40827E-11	0.00000	.22531E-11	0.00000	-.10661E+00	0.00000	.11608E-12	0.00000
-.10385E-13	0.00000	.22764E-11	0.00000	.40422E-11	0.00000	.22499E-11	0.00000	.10661E+00	0.00000	.52090E-13	0.00000
.98914E-14	0.00000	-.31933E-11	0.00000	-.14105E-11	0.00000	.46386E-12	0.00000	-.34499E+00	0.00000	-.43333E-13	0.00000
-.44077E-13	0.00000	.35266E-11	0.00000	-.14284E-11	0.00000	.47446E-12	0.00000	.34499E+00	0.00000	-.49286E-13	0.00000
.79557E-13	0.00000	-.14777E-11	0.00000	-.12308E-11	0.00000	.17061E-11	0.00000	-.10661E+00	0.00000	.49007E-13	0.00000
.31539E-13	0.00000	.15599E-11	0.00000	-.12199E-11	0.00000	.17050E-11	0.00000	.10661E+00	0.00000	.60222E-13	0.00000
-.17713E-13	0.00000	.25724E-11	0.00000	.79203E-12	0.00000	-.31210E-11	0.00000	.27911E+00	0.00000	-.10912E-12	0.00000
-.74642E-13	0.00000	-.27866E-11	0.00000	.78639E-12	0.00000	-.31584E-11	0.00000	-.27911E+00	0.00000	-.10967E-12	0.00000

NATURAL FREQUENCY= .113954E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.15875E+00	0.00000	-.75649E-13	0.00000	.41728E-14	0.00000	.12013E-12	0.00000	.15527E-12	0.00000	.37649E+00	0.00000
-.15875E+00	0.00000	.14186E-13	0.00000	.28922E-13	0.00000	-.73123E-13	0.00000	.16630E-12	0.00000	.37649E+00	0.00000
-.21752E+00	0.00000	-.68175E-14	0.00000	.95281E-14	0.00000	-.24109E-13	0.00000	-.35917E-13	0.00000	-.36266E-01	0.00000
.21752E+00	0.00000	.76396E-14	0.00000	-.26739E-13	0.00000	-.42067E-14	0.00000	-.40307E-13	0.00000	-.36266E-01	0.00000
-.11797E+00	0.00000	.85331E-14	0.00000	.12048E-13	0.00000	-.36602E-14	0.00000	.30257E-13	0.00000	.10651E+00	0.00000
-.11797E+00	0.00000	.18408E-13	0.00000	.65048E-15	0.00000	.18469E-14	0.00000	.10773E-12	0.00000	.10651E+00	0.00000
.10921E+00	0.00000	.13347E-13	0.00000	-.67891E-14	0.00000	-.65882E-14	0.00000	-.32626E-13	0.00000	-.66479E-01	0.00000
.10921E+00	0.00000	.62301E-14	0.00000	-.22351E-13	0.00000	.25439E-13	0.00000	.13084E-12	0.00000	-.66479E-01	0.00000
-.50006E-01	0.00000	.13517E-13	0.00000	.11460E-13	0.00000	.43228E-14	0.00000	-.33621E-13	0.00000	-.28079E-12	0.00000
-.50006E-01	0.00000	-.19710E-13	0.00000	.21321E-13	0.00000						
-.50006E-01	0.00000	.15597E-13	0.00000	.15662E-13	0.00000						
-.50006E-01	0.00000	-.21648E-13	0.00000	.18011E-13	0.00000	.95506E-15	0.00000	.71547E-13	0.00000	-.16514E-12	0.00000
.10921E+00	0.00000	.41639E-13	0.00000	-.71024E-13	0.00000	-.30350E-13	0.00000	.77071E-13	0.00000	.66479E-01	0.00000
.10921E+00	0.00000	-.36171E-13	0.00000	-.68814E-13	0.00000	-.31810E-14	0.00000	-.15160E-12	0.00000	.66479E-01	0.00000
.11797E+00	0.00000	.48596E-13	0.00000	.38601E-13	0.00000	-.63388E-14	0.00000	.16238E-12	0.00000	-.10651E+00	0.00000
.11797E+00	0.00000	-.30380E-13	0.00000	.36898E-13	0.00000	-.20530E-14	0.00000	-.17059E-12	0.00000	-.10651E+00	0.00000
.21752E+00	0.00000	.13217E-13	0.00000	.16447E-13	0.00000	-.10977E-13	0.00000	.61769E-13	0.00000	.36266E-01	0.00000
.21752E+00	0.00000	-.25184E-13	0.00000	.26505E-13	0.00000	.88595E-14	0.00000	-.23777E-13	0.00000	.36266E-01	0.00000
.15875E+00	0.00000	.20556E-14	0.00000	-.89626E-14	0.00000	.27222E-13	0.00000	-.14412E-12	0.00000	-.37649E+00	0.00000
.15875E+00	0.00000	.39469E-14	0.00000	-.23454E-13	0.00000	.28856E-13	0.00000	.78079E-13	0.00000	-.37649E+00	0.00000

NATURAL FREQUENCY= .115719E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.15026E+00	0.00000	-.16534E-13	0.00000	.89122E-14	0.00000	-.30020E-14	0.00000	-.42218E-12	0.00000	-.33629E+00	0.00000
.15026E+00	0.00000	-.35156E-13	0.00000	-.97639E-13	0.00000	.11180E-13	0.00000	-.50985E-12	0.00000	-.33629E+00	0.00000
-.21765E+00	0.00000	-.86780E-14	0.00000	.88480E-13	0.00000	-.24858E-13	0.00000	-.27559E-13	0.00000	.48380E-02	0.00000
-.21765E+00	0.00000	-.46812E-13	0.00000	.47843E-14	0.00000	-.18305E-13	0.00000	-.14652E-12	0.00000	.48380E-02	0.00000
.14247E+00	0.00000	.25714E-13	0.00000	-.51596E-13	0.00000	-.34635E-13	0.00000	-.19583E-12	0.00000	-.51290E-01	0.00000
.14247E+00	0.00000	.15320E-13	0.00000	-.71653E-13	0.00000	-.13578E-13	0.00000	-.72113E-13	0.00000	-.51290E-01	0.00000
-.17058E+00	0.00000	.13394E-14	0.00000	.19890E-13	0.00000	-.27729E-14	0.00000	-.58360E-12	0.00000	.14918E-01	0.00000
-.17058E+00	0.00000	.45433E-13	0.00000	.12099E-13	0.00000	.48819E-13	0.00000	-.43602E-12	0.00000	.14918E-01	0.00000
.12950E+00	0.00000	.87968E-14	0.00000	.87161E-14	0.00000	.11140E-13	0.00000	-.98168E-13	0.00000	.12950E+00	0.00000
.12950E+00	0.00000	-.73756E-14	0.00000	.94817E-14	0.00000						
-.12950E+00	0.00000	.92194E-14	0.00000	.21824E-13	0.00000						
-.12950E+00	0.00000	-.61691E-14	0.00000	.33103E-13	0.00000	.14436E-13	0.00000	-.11106E-12	0.00000	.12950E+00	0.00000
.17058E+00	0.00000	.34622E-13	0.00000	-.49690E-13	0.00000	-.24108E-13	0.00000	.40983E-12	0.00000	.14918E-01	0.00000
.17058E+00	0.00000	-.21069E-13	0.00000	-.57336E-13	0.00000	.95353E-15	0.00000	.38012E-12	0.00000	.14918E-01	0.00000
-.14247E+00	0.00000	.41622E-13	0.00000	.12321E-13	0.00000	-.40918E-13	0.00000	-.51197E-13	0.00000	-.51290E-01	0.00000
-.14247E+00	0.00000	-.29179E-13	0.00000	.79507E-14	0.00000	.54778E-14	0.00000	-.62771E-13	0.00000	-.51290E-01	0.00000
.21765E+00	0.00000	.99199E-14	0.00000	.37389E-13	0.00000	-.21912E-13	0.00000	.12087E-12	0.00000	.48380E-02	0.00000
.21765E+00	0.00000	-.35069E-13	0.00000	.34408E-13	0.00000	-.12909E-13	0.00000	.12853E-12	0.00000	.48380E-02	0.00000
-.15026E+00	0.00000	-.28693E-13	0.00000	-.67802E-14	0.00000	-.85738E-14	0.00000	.66201E-13	0.00000	-.33629E+00	0.00000
-.15026E+00	0.00000	.19194E-13	0.00000	-.23310E-13	0.00000	.84793E-14	0.00000	.51443E-13	0.00000	-.33629E+00	0.00000

NATURAL FREQUENCY= .112800E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.48124E-13	0.00000	.13893E+00	0.00000	-.40324E-01	0.00000	-.16302E+00	0.00000	-.27254E-11	0.00000	-.60602E-13	0.00000
.24443E-13	0.00000	-.13893E+00	0.00000	-.40324E-01	0.00000	-.16302E+00	0.00000	.29337E-11	0.00000	.12783E-12	0.00000
-.31477E-13	0.00000	-.80033E-01	0.00000	.63895E-01	0.00000	.88913E-01	0.00000	.10518E-11	0.00000	-.56754E-13	0.00000
.95663E-13	0.00000	.80033E-01	0.00000	.63895E-01	0.00000	.88913E-01	0.00000	-.10671E-11	0.00000	-.38746E-13	0.00000
.66441E-14	0.00000	-.17616E+00	0.00000	.73692E-01	0.00000	.25126E-01	0.00000	.34868E-11	0.00000	-.18399E-13	0.00000
-.36706E-13	0.00000	.17616E+00	0.00000	.73692E-01	0.00000	.25126E-01	0.00000	-.34637E-11	0.00000	-.25426E-13	0.00000
-.27068E-13	0.00000	-.11467E+00	0.00000	-.21312E+00	0.00000	.11820E+00	0.00000	.10448E-11	0.00000	-.35704E-13	0.00000
.60529E-13	0.00000	.11467E+00	0.00000	-.21312E+00	0.00000	.11820E+00	0.00000	-.11447E-11	0.00000	-.19737E-13	0.00000
-.18257E-13	0.00000	.11675E+00	0.00000	.20873E+00	0.00000	-.20873E+00	0.00000	-.28058E-11	0.00000	.17032E-13	0.00000
-.54258E-13	0.00000	-.11675E+00	0.00000	.20873E+00	0.00000						
-.63367E-13	0.00000	.11675E+00	0.00000	-.20873E+00	0.00000						
.10910E-12	0.00000	-.11675E+00	0.00000	-.20873E+00	0.00000	-.20873E+00	0.00000	.28741E-11	0.00000	-.49381E-13	0.00000
-.14603E-13	0.00000	-.11467E+00	0.00000	.21312E+00	0.00000	.11820E+00	0.00000	.10762E-11	0.00000	-.21600E-13	0.00000
-.79090E-14	0.00000	.11467E+00	0.00000	.21312E+00	0.00000	.11820E+00	0.00000	-.94534E-12	0.00000	.34992E-13	0.00000
-.39084E-13	0.00000	-.17616E+00	0.00000	-.73692E-01	0.00000	.25126E-01	0.00000	.35028E-11	0.00000	-.18980E-13	0.00000
.54468E-13	0.00000	.17616E+00	0.00000	-.73692E-01	0.00000	.25126E-01	0.00000	-.35418E-11	0.00000	-.19539E-13	0.00000
.95910E-14	0.00000	-.80033E-01	0.00000	-.63895E-01	0.00000	.88913E-01	0.00000	.11082E-11	0.00000	.25915E-13	0.00000
-.74676E-14	0.00000	.80033E-01	0.00000	-.63895E-01	0.00000	.88913E-01	0.00000	-.10373E-11	0.00000	.25644E-13	0.00000
-.14345E-13	0.00000	.13893E+00	0.00000	.40324E-01	0.00000	-.16302E+00	0.00000	-.28276E-11	0.00000	-.60701E-13	0.00000
.15236E-13	0.00000	-.13893E+00	0.00000	.40324E-01	0.00000	-.16302E+00	0.00000	.28118E-11	0.00000	.89231E-14	0.00000

NATURAL FREQUENCY= .119248E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.36195E-13	0.00000	-.85934E-14	0.00000	-.20013E+00	0.00000	.42984E+00	0.00000	-.64178E-13	0.00000	-.16460E-13	0.00000
-.11658E-13	0.00000	-.59705E-13	0.00000	.20013E+00	0.00000	-.42984E+00	0.00000	-.10513E-12	0.00000	-.75684E-13	0.00000
.29928E-13	0.00000	-.27863E-13	0.00000	.11319E+00	0.00000	.10556E+00	0.00000	-.12612E-12	0.00000	-.71111E-14	0.00000
-.72628E-13	0.00000	.38959E-13	0.00000	-.11319E+00	0.00000	-.10556E+00	0.00000	.84239E-13	0.00000	.10880E-13	0.00000
.33423E-13	0.00000	-.27707E-13	0.00000	.85664E-01	0.00000	-.36624E-01	0.00000	-.57497E-13	0.00000	.17015E-13	0.00000
-.39772E-14	0.00000	.96447E-13	0.00000	-.85664E-01	0.00000	.36624E-01	0.00000	-.74930E-13	0.00000	-.22077E-14	0.00000
.35663E-13	0.00000	-.28403E-14	0.00000	.12242E-01	0.00000	-.35388E-01	0.00000	.99227E-13	0.00000	.16268E-13	0.00000
-.51998E-13	0.00000	.23315E-13	0.00000	-.12242E-01	0.00000	.35388E-01	0.00000	-.13979E-12	0.00000	.32555E-13	0.00000
.58792E-13	0.00000	.34826E-13	0.00000	-.10971E-01	0.00000	.21318E-12	0.00000	-.11680E-12	0.00000	.23610E-13	0.00000
-.55526E-13	0.00000	-.44454E-13	0.00000	.10971E-01	0.00000						
.11402E-12	0.00000	.61480E-13	0.00000	-.10971E-01	0.00000						
-.89306E-13	0.00000	-.74827E-13	0.00000	.10971E-01	0.00000	-.21024E-12	0.00000	-.60083E-13	0.00000	.46764E-13	0.00000
.30993E-13	0.00000	-.12265E-13	0.00000	.12242E-01	0.00000	.35388E-01	0.00000	-.22656E-12	0.00000	-.18992E-13	0.00000
-.76722E-13	0.00000	.99854E-14	0.00000	-.12242E-01	0.00000	-.35388E-01	0.00000	-.97352E-13	0.00000	.85042E-15	0.00000
.11269E-12	0.00000	-.54297E-13	0.00000	.85664E-01	0.00000	.36624E-01	0.00000	-.78769E-13	0.00000	.59176E-13	0.00000
-.84442E-13	0.00000	.68251E-13	0.00000	-.85664E-01	0.00000	-.36624E-01	0.00000	-.61248E-13	0.00000	-.44591E-13	0.00000
-.41172E-13	0.00000	-.31552E-13	0.00000	.11319E+00	0.00000	-.10556E+00	0.00000	-.75276E-13	0.00000	.44170E-13	0.00000
-.38038E-13	0.00000	.40039E-13	0.00000	-.11319E+00	0.00000	.10556E+00	0.00000	-.15359E-12	0.00000	-.20450E-13	0.00000
.35952E-13	0.00000	.53852E-13	0.00000	-.20013E+00	0.00000	-.42984E+00	0.00000	.73155E-13	0.00000	.28969E-12	0.00000
.38418E-13	0.00000	-.47868E-13	0.00000	.20013E+00	0.00000	.42984E+00	0.00000	.17155E-12	0.00000	-.10856E-12	0.00000

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.10685E-12	0.00000	-.83688E-14	0.00000	-.20082E+00	0.00000	.43013E+00	0.00000	.20487E-12	0.00000	-.96927E-13	0.00000
.12322E-12	0.00000	-.54301E-13	0.00000	.20082E+00	0.00000	-.43013E+00	0.00000	.18179E-12	0.00000	.57894E-13	0.00000
-.97178E-13	0.00000	-.39435E-13	0.00000	.11248E+00	0.00000	.10583E+00	0.00000	.29516E-13	0.00000	-.19410E-13	0.00000
.86701E-13	0.00000	.43985E-13	0.00000	-.11248E+00	0.00000	-.10583E+00	0.00000	.22121E-12	0.00000	.32627E-13	0.00000
-.78989E-13	0.00000	-.47346E-13	0.00000	.85624E-01	0.00000	-.34726E-01	0.00000	.13395E-12	0.00000	-.64527E-14	0.00000
.88452E-13	0.00000	.79640E-13	0.00000	-.85624E-01	0.00000	.34726E-01	0.00000	.56342E-13	0.00000	.11977E-13	0.00000
-.46389E-13	0.00000	-.16325E-13	0.00000	.16704E-01	0.00000	-.31182E-01	0.00000	.25810E-12	0.00000	.85503E-14	0.00000
.69863E-13	0.00000	-.39137E-14	0.00000	-.16704E-01	0.00000	.31182E-01	0.00000	-.34644E-13	0.00000	.18389E-13	0.00000
-.56366E-13	0.00000	.17032E-13	0.00000	.51597E-03	0.00000	-.51597E-03	0.00000	.67936E-14	0.00000	-.46545E-13	0.00000
.31891E-13	0.00000	-.66504E-13	0.00000	-.51597E-03	0.00000						
.60019E-13	0.00000	.25689E-13	0.00000	-.51597E-03	0.00000						
-.24568E-14	0.00000	-.76630E-13	0.00000	.51597E-03	0.00000	.51597E-03	0.00000	.10614E-12	0.00000	.12881E-13	0.00000
-.10886E-12	0.00000	-.70940E-14	0.00000	-.16704E-01	0.00000	-.31182E-01	0.00000	-.56788E-13	0.00000	.81542E-14	0.00000
.16256E-13	0.00000	.19549E-13	0.00000	.16704E-01	0.00000	.31182E-01	0.00000	.83968E-13	0.00000	-.19313E-13	0.00000
-.71938E-14	0.00000	-.38128E-13	0.00000	-.85624E-01	0.00000	-.34726E-01	0.00000	.15663E-12	0.00000	.45893E-13	0.00000
.60894E-13	0.00000	.75154E-13	0.00000	.85624E-01	0.00000	.34726E-01	0.00000	.83173E-13	0.00000	-.15469E-13	0.00000
-.13601E-12	0.00000	-.30720E-13	0.00000	-.11248E+00	0.00000	.10583E+00	0.00000	.19912E-12	0.00000	.21596E-13	0.00000
.34882E-13	0.00000	.24523E-13	0.00000	.11248E+00	0.00000	-.10583E+00	0.00000	.53393E-15	0.00000	.96429E-14	0.00000
-.36299E-13	0.00000	.16831E-13	0.00000	.20082E+00	0.00000	.43013E+00	0.00000	.12988E-12	0.00000	.17214E-12	0.00000
.12355E-12	0.00000	-.60286E-13	0.00000	-.20082E+00	0.00000	-.43013E+00	0.00000	.23854E-12	0.00000	.50670E-13	0.00000

NATURAL FREQUENCY= .119340E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.13119E+00	0.00000	-.11672E-13	0.00000	.15327E-12	0.00000	-.37830E-12	0.00000	-.19679E+00	0.00000	.80226E-11	0.00000
.13119E+00	0.00000	-.76447E-13	0.00000	-.15193E-12	0.00000	.27537E-12	0.00000	-.19679E+00	0.00000	-.73871E-11	0.00000
.13119E+00	0.00000	.40946E-13	0.00000	-.71850E-13	0.00000	-.96939E-13	0.00000	-.19679E+00	0.00000	.27391E-11	0.00000
.13119E+00	0.00000	.30796E-13	0.00000	.72826E-13	0.00000	.67362E-13	0.00000	-.19679E+00	0.00000	-.27965E-11	0.00000
.13119E+00	0.00000	-.10072E-13	0.00000	-.28077E-13	0.00000	.38036E-13	0.00000	-.19679E+00	0.00000	.23385E-11	0.00000
.13119E+00	0.00000	.71030E-13	0.00000	.10944E-12	0.00000	-.22022E-13	0.00000	-.19679E+00	0.00000	-.21890E-11	0.00000
.13119E+00	0.00000	-.53964E-13	0.00000	-.86737E-13	0.00000	.59088E-13	0.00000	-.19679E+00	0.00000	.97289E-12	0.00000
.13119E+00	0.00000	.73519E-13	0.00000	-.40031E-13	0.00000	.34138E-13	0.00000	-.19679E+00	0.00000	-.10686E-11	0.00000
.13119E+00	0.00000	-.64862E-15	0.00000	.41016E-13	0.00000	-.48896E-13	0.00000	-.19679E+00	0.00000	-.16123E-11	0.00000
.13119E+00	0.00000	-.44811E-13	0.00000	.44551E-13	0.00000						
.13119E+00	0.00000	.38556E-15	0.00000	-.63263E-13	0.00000						
.13119E+00	0.00000	-.44502E-13	0.00000	-.45695E-13	0.00000	-.46521E-13	0.00000	-.19679E+00	0.00000	.14495E-11	0.00000
.13119E+00	0.00000	-.13553E-13	0.00000	.68516E-13	0.00000	.49081E-13	0.00000	-.19679E+00	0.00000	.14855E-12	0.00000
.13119E+00	0.00000	.41282E-13	0.00000	.46361E-13	0.00000	.22442E-13	0.00000	-.19679E+00	0.00000	-.34972E-14	0.00000
.13119E+00	0.00000	-.19851E-13	0.00000	-.12159E-13	0.00000	.24185E-13	0.00000	-.19679E+00	0.00000	-.35791E-12	0.00000
.13119E+00	0.00000	.87099E-13	0.00000	-.46800E-13	0.00000	.40447E-14	0.00000	-.19679E+00	0.00000	.51117E-12	0.00000
.13119E+00	0.00000	-.30937E-13	0.00000	-.32459E-14	0.00000	.19935E-13	0.00000	-.19679E+00	0.00000	-.69776E-13	0.00000
.13119E+00	0.00000	.51678E-13	0.00000	-.15149E-13	0.00000	.51980E-13	0.00000	-.19679E+00	0.00000	.27339E-12	0.00000
.13119E+00	0.00000	-.27179E-13	0.00000	-.11728E-13	0.00000	-.10856E-12	0.00000	-.19679E+00	0.00000	-.11003E-11	0.00000
.13119E+00	0.00000	-.80480E-13	0.00000	.25347E-13	0.00000	.85288E-14	0.00000	-.19679E+00	0.00000	.13792E-11	0.00000

NATURAL FREQUENCY= .120278E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.13611E+00	0.00000	.52467E-13	0.00000	-.57843E-14	0.00000	.19783E-12	0.00000	-.36563E+00	0.00000	.24117E+00	0.00000
-.13611E+00	0.00000	.39601E-13	0.00000	.78650E-15	0.00000	-.21392E-12	0.00000	-.36563E+00	0.00000	-.24117E+00	0.00000
.13474E+00	0.00000	-.23400E-13	0.00000	.72026E-13	0.00000	.43506E-13	0.00000	-.36984E-01	0.00000	.79296E-01	0.00000
-.13474E+00	0.00000	.13011E-13	0.00000	-.78411E-13	0.00000	-.14978E-13	0.00000	-.36984E-01	0.00000	-.79296E-01	0.00000
-.21215E-01	0.00000	-.92983E-13	0.00000	.42357E-13	0.00000	-.37807E-13	0.00000	-.32993E-01	0.00000	.61701E-01	0.00000
.21215E-01	0.00000	-.41978E-13	0.00000	-.59664E-14	0.00000	.39654E-13	0.00000	-.32993E-01	0.00000	-.61701E-01	0.00000
.11144E-01	0.00000	-.70777E-13	0.00000	-.49081E-13	0.00000	-.39364E-13	0.00000	.99759E-01	0.00000	.21214E-01	0.00000
-.11144E-01	0.00000	-.27878E-13	0.00000	-.14579E-13	0.00000	.42230E-13	0.00000	.99759E-01	0.00000	-.21214E-01	0.00000
-.64030E-01	0.00000	.64986E-13	0.00000	.35125E-13	0.00000	-.32958E-13	0.00000	-.26560E-11	0.00000	-.64030E-01	0.00000
.64030E-01	0.00000	.42350E-13	0.00000	.43137E-13	0.00000						
.64030E-01	0.00000	.63052E-13	0.00000	-.46172E-13	0.00000						
-.64030E-01	0.00000	.42961E-13	0.00000	-.25766E-13	0.00000	-.33576E-13	0.00000	-.26999E-11	0.00000	.64030E-01	0.00000
-.11144E-01	0.00000	-.32737E-13	0.00000	.62753E-13	0.00000	.32717E-13	0.00000	-.99759E-01	0.00000	.21214E-01	0.00000
.11144E-01	0.00000	.17777E-13	0.00000	.55934E-13	0.00000	.22157E-13	0.00000	-.99759E-01	0.00000	-.21214E-01	0.00000
.21215E-01	0.00000	-.66871E-13	0.00000	-.50294E-13	0.00000	-.18902E-13	0.00000	.32993E-01	0.00000	.61701E-01	0.00000
-.21215E-01	0.00000	-.26124E-13	0.00000	-.37939E-13	0.00000	-.60718E-14	0.00000	.32993E-01	0.00000	-.61701E-01	0.00000
-.13474E+00	0.00000	-.38501E-13	0.00000	-.16280E-13	0.00000	.62210E-14	0.00000	.36984E-01	0.00000	.79296E-01	0.00000
.13474E+00	0.00000	-.38512E-13	0.00000	.10544E-13	0.00000	.24544E-13	0.00000	.36984E-01	0.00000	-.79296E-01	0.00000
-.13611E+00	0.00000	.11299E-12	0.00000	.43197E-13	0.00000	-.37701E-13	0.00000	.36563E+00	0.00000	.24117E+00	0.00000
.13611E+00	0.00000	-.35206E-14	0.00000	-.16170E-13	0.00000	-.79234E-13	0.00000	.36563E+00	0.00000	-.24117E+00	0.00000

NATURAL FREQUENCY= .120186E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.10132E+00	0.00000	-.67524E-13	0.00000	-.10077E-12	0.00000	.46141E-13	0.00000	.32835E+00	0.00000	-.27462E+00	0.00000
.10132E+00	0.00000	-.76297E-13	0.00000	.46113E-13	0.00000	-.71775E-13	0.00000	.32835E+00	0.00000	.27462E+00	0.00000
-.98268E-01	0.00000	.17747E-13	0.00000	.52627E-13	0.00000	.49436E-13	0.00000	-.26183E-01	0.00000	-.79082E-01	0.00000
.98268E-01	0.00000	.23343E-13	0.00000	.92212E-14	0.00000	-.64504E-13	0.00000	-.26183E-01	0.00000	.79082E-01	0.00000
.55556E-01	0.00000	.79339E-13	0.00000	-.88860E-14	0.00000	-.54880E-13	0.00000	-.37810E-01	0.00000	-.76197E-01	0.00000
-.55556E-01	0.00000	.31644E-13	0.00000	-.96790E-13	0.00000	.31277E-14	0.00000	-.37810E-01	0.00000	.76197E-01	0.00000
.54992E-01	0.00000	.14050E-13	0.00000	-.61243E-14	0.00000	-.11164E-13	0.00000	-.13846E+00	0.00000	-.16886E-01	0.00000
-.54992E-01	0.00000	-.41459E-13	0.00000	.16286E-13	0.00000	.23794E-13	0.00000	-.13846E+00	0.00000	.16886E-01	0.00000
.89043E-01	0.00000	-.52016E-13	0.00000	-.87854E-14	0.00000	.36410E-13	0.00000	-.12590E+00	0.00000	.25554E-11	0.00000
-.89043E-01	0.00000	-.10881E-13	0.00000	-.14810E-13	0.00000						
.89043E-01	0.00000	-.51668E-13	0.00000	.41912E-13	0.00000						
-.89043E-01	0.00000	-.13948E-13	0.00000	.45866E-13	0.00000	.30155E-13	0.00000	-.12590E+00	0.00000	-.24052E-11	0.00000
.54992E-01	0.00000	.43836E-13	0.00000	-.67592E-13	0.00000	-.91052E-14	0.00000	-.13846E+00	0.00000	.16886E-01	0.00000
-.54992E-01	0.00000	-.19410E-13	0.00000	-.40621E-13	0.00000	-.49933E-13	0.00000	-.13846E+00	0.00000	-.16886E-01	0.00000
.55556E-01	0.00000	.73726E-13	0.00000	.28821E-13	0.00000	-.13798E-13	0.00000	-.37810E-01	0.00000	.76197E-01	0.00000
-.55556E-01	0.00000	-.11437E-13	0.00000	.30012E-13	0.00000	-.27700E-13	0.00000	-.37810E-01	0.00000	-.76197E-01	0.00000
-.98268E-01	0.00000	.46672E-13	0.00000	.44001E-13	0.00000	-.17604E-13	0.00000	-.26183E-01	0.00000	.79082E-01	0.00000
.98268E-01	0.00000	.34514E-13	0.00000	.23159E-13	0.00000	-.14875E-13	0.00000	-.26183E-01	0.00000	-.79082E-01	0.00000
.10132E+00	0.00000	-.93134E-13	0.00000	-.37534E-13	0.00000	.64332E-13	0.00000	.32835E+00	0.00000	.27462E+00	0.00000
.10132E+00	0.00000	.20269E-13	0.00000	-.29246E-13	0.00000	.58152E-13	0.00000	.32835E+00	0.00000	-.27462E+00	0.00000

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.23455E-14	0.00000	.58988E-14	0.00000	.15669E-12	0.00000	.56467E-13	0.00000	.21426E+00	0.00000	-.32914E-13	0.00000
.89637E-14	0.00000	-.14190E-13	0.00000	-.10845E-12	0.00000	.15698E-12	0.00000	-.21426E+00	0.00000	.11825E-13	0.00000
.27054E-14	0.00000	.80540E-13	0.00000	-.81330E-14	0.00000	-.18868E-12	0.00000	-.28868E+00	0.00000	-.68835E-13	0.00000
-.27662E-14	0.00000	-.68140E-13	0.00000	-.89283E-13	0.00000	.50004E-13	0.00000	.28868E+00	0.00000	-.10683E-13	0.00000
.35083E-13	0.00000	.23924E-13	0.00000	-.10091E-12	0.00000	-.13791E-12	0.00000	-.11401E+00	0.00000	-.86682E-14	0.00000
-.22249E-13	0.00000	-.14924E-13	0.00000	.16212E-12	0.00000	.10708E-12	0.00000	.11401E+00	0.00000	.32611E-14	0.00000
-.22265E-13	0.00000	-.50985E-13	0.00000	-.28308E-12	0.00000	.30766E-13	0.00000	.32827E+00	0.00000	.77057E-14	0.00000
-.61006E-14	0.00000	.48381E-13	0.00000	.15778E-12	0.00000	.43421E-13	0.00000	-.32827E+00	0.00000	-.47218E-13	0.00000
.12485E-13	0.00000	.89571E-14	0.00000	-.11030E-12	0.00000	.76236E-13	0.00000	.19398E-12	0.00000	.39563E-13	0.00000
.18651E-13	0.00000	.27415E-13	0.00000	.18802E-12	0.00000						
-.29755E-13	0.00000	-.73609E-14	0.00000	-.72107E-14	0.00000						
.31773E-13	0.00000	.33180E-13	0.00000	-.82246E-13	0.00000	-.15982E-12	0.00000	-.10834E-12	0.00000	.38599E-14	0.00000
-.87302E-14	0.00000	-.11891E-13	0.00000	.13472E-12	0.00000	.56911E-13	0.00000	-.32827E+00	0.00000	-.23095E-13	0.00000
.27582E-13	0.00000	.34717E-14	0.00000	-.92106E-13	0.00000	-.31119E-13	0.00000	.32827E+00	0.00000	-.39235E-13	0.00000
-.22653E-13	0.00000	.35950E-13	0.00000	.11956E-12	0.00000	.13078E-13	0.00000	.11401E+00	0.00000	.87864E-14	0.00000
.39254E-13	0.00000	-.39665E-13	0.00000	-.16958E-12	0.00000	-.36199E-13	0.00000	-.11401E+00	0.00000	.12912E-13	0.00000
-.89714E-15	0.00000	.53759E-13	0.00000	.22259E-12	0.00000	-.21303E-13	0.00000	.28868E+00	0.00000	-.38605E-13	0.00000
.26898E-14	0.00000	-.44597E-13	0.00000	-.13662E-12	0.00000	-.36664E-13	0.00000	-.28868E+00	0.00000	-.24091E-13	0.00000
-.31048E-13	0.00000	-.29672E-13	0.00000	.12477E-12	0.00000	.59413E-13	0.00000	-.21426E+00	0.00000	-.11700E-13	0.00000
.13235E-13	0.00000	.28070E-13	0.00000	-.14474E-12	0.00000	.10343E-12	0.00000	.21426E+00	0.00000	-.68453E-14	0.00000

NATURAL FREQUENCY= .118144E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.61737E-01	0.00000	-.20454E-13	0.00000	.13426E-12	0.00000	-.24737E-12	0.00000	-.96818E-01	0.00000	.60996E-01	0.00000
-.61737E-01	0.00000	-.16225E-13	0.00000	-.11164E-12	0.00000	.29097E-12	0.00000	-.96818E-01	0.00000	-.60996E-01	0.00000
.53717E-01	0.00000	.15270E-13	0.00000	-.97864E-13	0.00000	-.58699E-13	0.00000	-.10270E+00	0.00000	-.35376E-01	0.00000
-.53717E-01	0.00000	.27079E-13	0.00000	.47041E-13	0.00000	.94229E-13	0.00000	-.10270E+00	0.00000	.35376E-01	0.00000
.13798E+00	0.00000	.28715E-13	0.00000	-.29182E-13	0.00000	.10092E-12	0.00000	-.79994E-01	0.00000	.20936E-01	0.00000
-.13798E+00	0.00000	.21084E-13	0.00000	.84919E-13	0.00000	-.26179E-13	0.00000	-.79994E-01	0.00000	-.20936E-01	0.00000
.82324E-02	0.00000	.11850E-13	0.00000	.23946E-13	0.00000	.45214E-13	0.00000	-.31946E+00	0.00000	-.54814E-01	0.00000
-.82324E-02	0.00000	.33988E-13	0.00000	.20030E-13	0.00000	-.22540E-13	0.00000	-.31946E+00	0.00000	.54814E-01	0.00000
.25744E+00	0.00000	-.47021E-13	0.00000	-.37889E-13	0.00000	.18445E-13	0.00000	-.67834E-13	0.00000	.25744E+00	0.00000
-.25744E+00	0.00000	.22320E-13	0.00000	-.31900E-13	0.00000						
-.25744E+00	0.00000	-.48964E-13	0.00000	-.10018E-13	0.00000						
.25744E+00	0.00000	.20653E-13	0.00000	.14981E-13	0.00000	.23132E-13	0.00000	-.23598E-12	0.00000	-.25744E+00	0.00000
-.82324E-02	0.00000	.22453E-13	0.00000	.23283E-13	0.00000	-.12356E-13	0.00000	.31946E+00	0.00000	-.54814E-01	0.00000
.82324E-02	0.00000	-.11334E-14	0.00000	-.10912E-13	0.00000	.10793E-13	0.00000	.31946E+00	0.00000	.54814E-01	0.00000
-.13798E+00	0.00000	.43135E-13	0.00000	-.64829E-14	0.00000	-.27923E-13	0.00000	.79994E-01	0.00000	.20936E-01	0.00000
.13798E+00	0.00000	-.76544E-14	0.00000	.68564E-14	0.00000	-.35511E-13	0.00000	.79994E-01	0.00000	-.20936E-01	0.00000
-.53717E-01	0.00000	.93228E-14	0.00000	.25629E-14	0.00000	-.30443E-13	0.00000	.10270E+00	0.00000	-.35376E-01	0.00000
.53717E-01	0.00000	-.22880E-13	0.00000	.31080E-15	0.00000	-.42140E-13	0.00000	.10270E+00	0.00000	.35376E-01	0.00000
-.61737E-01	0.00000	-.15672E-13	0.00000	-.63899E-14	0.00000	.13036E-13	0.00000	.96818E-01	0.00000	.60996E-01	0.00000
.61737E-01	0.00000	-.55979E-14	0.00000	-.68367E-14	0.00000	.45354E-14	0.00000	.96818E-01	0.00000	-.60996E-01	0.00000

NATURAL FREQUENCY= .123147E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.89492E-01	0.00000	.13936E-13	0.00000	-.37908E-13	0.00000	-.46685E-13	0.00000	.10027E-01	0.00000	-.28216E+00	0.00000
-.89492E-01	0.00000	-.54418E-13	0.00000	.41469E-13	0.00000	-.25330E-13	0.00000	.10027E-01	0.00000	.28216E+00	0.00000
.46351E-01	0.00000	.28497E-13	0.00000	-.18318E-13	0.00000	.39009E-13	0.00000	-.27720E+00	0.00000	.12517E-01	0.00000
-.46351E-01	0.00000	.60125E-14	0.00000	.49560E-13	0.00000	-.52397E-13	0.00000	-.27720E+00	0.00000	-.12517E-01	0.00000
.64333E-01	0.00000	.11660E-13	0.00000	.85908E-14	0.00000	.39538E-14	0.00000	-.80737E-01	0.00000	.59509E-01	0.00000
-.64333E-01	0.00000	.27887E-13	0.00000	-.48824E-14	0.00000	-.36705E-13	0.00000	-.80737E-01	0.00000	-.59509E-01	0.00000
-.63007E-01	0.00000	-.12666E-13	0.00000	-.67391E-14	0.00000	.31038E-14	0.00000	.10621E+00	0.00000	.10888E+00	0.00000
.63007E-01	0.00000	.54505E-14	0.00000	-.21903E-13	0.00000	.18773E-13	0.00000	.10621E+00	0.00000	-.10888E+00	0.00000
-.13717E+00	0.00000	-.30824E-13	0.00000	.48034E-13	0.00000	-.35607E-13	0.00000	.24170E+00	0.00000	.54863E-12	0.00000
.13717E+00	0.00000	-.85468E-14	0.00000	-.56466E-14	0.00000						
-.13717E+00	0.00000	-.30853E-13	0.00000	-.29444E-13	0.00000						
.13717E+00	0.00000	-.12659E-13	0.00000	-.12655E-13	0.00000	-.77424E-14	0.00000	.24170E+00	0.00000	-.48251E-12	0.00000
-.63007E-01	0.00000	-.44274E-15	0.00000	-.28528E-13	0.00000	.24825E-13	0.00000	.10621E+00	0.00000	-.10888E+00	0.00000
.63007E-01	0.00000	-.14679E-13	0.00000	-.39903E-13	0.00000	-.13319E-13	0.00000	.10621E+00	0.00000	.10888E+00	0.00000
.64333E-01	0.00000	.34570E-13	0.00000	.11602E-13	0.00000	-.38661E-13	0.00000	-.80737E-01	0.00000	-.59509E-01	0.00000
-.64333E-01	0.00000	-.39832E-14	0.00000	.16673E-13	0.00000	-.19804E-13	0.00000	-.80737E-01	0.00000	.59509E-01	0.00000
.46351E-01	0.00000	.57039E-13	0.00000	-.63425E-14	0.00000	-.12678E-13	0.00000	-.27720E+00	0.00000	-.12517E-01	0.00000
-.46351E-01	0.00000	.15616E-13	0.00000	.95339E-14	0.00000	-.47880E-13	0.00000	-.27720E+00	0.00000	.12517E-01	0.00000
.89492E-01	0.00000	-.14171E-13	0.00000	.22104E-13	0.00000	-.15732E-14	0.00000	.10027E-01	0.00000	.28216E+00	0.00000
-.89492E-01	0.00000	-.20621E-13	0.00000	.22270E-13	0.00000	.32138E-13	0.00000	.10027E-01	0.00000	-.28216E+00	0.00000

NATURAL FREQUENCY= .121916E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.10034E+00	0.00000	.51093E-13	0.00000	.97775E-13	0.00000	-.23311E-12	0.00000	.20654E-02	0.00000	.28552E+00	0.00000
.10034E+00	0.00000	-.29017E-13	0.00000	-.84424E-13	0.00000	.15969E-12	0.00000	.20654E-02	0.00000	-.28552E+00	0.00000
-.76487E-01	0.00000	-.37875E-13	0.00000	-.57911E-13	0.00000	.13631E-13	0.00000	.29451E+00	0.00000	.41771E-02	0.00000
.76487E-01	0.00000	.26233E-13	0.00000	.19214E-13	0.00000	.66409E-13	0.00000	.29451E+00	0.00000	-.41771E-02	0.00000
-.10597E+00	0.00000	-.19138E-13	0.00000	-.39967E-15	0.00000	.35185E-14	0.00000	.18410E+00	0.00000	-.79940E-02	0.00000
.10597E+00	0.00000	.32621E-13	0.00000	.93713E-13	0.00000	-.19491E-13	0.00000	.18410E+00	0.00000	.79940E-02	0.00000
-.61947E-01	0.00000	-.34533E-13	0.00000	-.37344E-13	0.00000	.51728E-13	0.00000	-.60820E-02	0.00000	-.10203E+00	0.00000
.61947E-01	0.00000	.25713E-13	0.00000	-.91055E-14	0.00000	-.60867E-14	0.00000	-.60820E-02	0.00000	.10203E+00	0.00000
.91187E-01	0.00000	.10270E-13	0.00000	.12525E-13	0.00000	-.82310E-14	0.00000	-.41165E-12	0.00000	.91187E-01	0.00000
-.91187E-01	0.00000	-.18372E-13	0.00000	-.10009E-13	0.00000						
-.91187E-01	0.00000	.98333E-14	0.00000	-.28825E-14	0.00000						
.91167E-01	0.00000	-.20235E-13	0.00000	-.31934E-13	0.00000	-.10637E-13	0.00000	-.45364E-12	0.00000	-.91187E-01	0.00000
.61947E-01	0.00000	.13524E-13	0.00000	.93051E-14	0.00000	-.10779E-13	0.00000	.60820E-02	0.00000	-.10203E+00	0.00000
-.61947E-01	0.00000	-.47386E-14	0.00000	.36175E-13	0.00000	-.39751E-14	0.00000	.60820E-02	0.00000	.10203E+00	0.00000
.10597E+00	0.00000	.13419E-13	0.00000	.76401E-15	0.00000	-.23321E-14	0.00000	-.18410E+00	0.00000	-.79940E-02	0.00000
-.10597E+00	0.00000	.18944E-13	0.00000	-.12054E-13	0.00000	-.64838E-14	0.00000	-.18410E+00	0.00000	.79940E-02	0.00000
.76487E-01	0.00000	.47638E-14	0.00000	-.38220E-14	0.00000	-.11181E-13	0.00000	-.29451E+00	0.00000	.41771E-02	0.00000
-.76487E-01	0.00000	.14499E-13	0.00000	.18602E-14	0.00000	.21517E-13	0.00000	-.29451E+00	0.00000	-.41771E-02	0.00000
.10034E+00	0.00000	-.56930E-14	0.00000	.42733E-14	0.00000	.16747E-13	0.00000	-.20654E-02	0.00000	.28552E+00	0.00000
-.10034E+00	0.00000	-.18643E-13	0.00000	.67008E-15	0.00000	.24987E-13	0.00000	-.20654E-02	0.00000	-.28552E+00	0.00000

NATURAL FREQUENCY= .127844E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
20150E-13	0.00000	.50334E-12	0.00000	.35519E-12	0.00000	-.46221E-12	0.00000	.19629E+00	0.00000	-.13071E-13	0.00000
.40666E-13	0.00000	-.50490E-12	0.00000	-.73040E-12	0.00000	-.93250E-12	0.00000	-.19629E+00	0.00000	.13193E-14	0.00000
.44272E-14	0.00000	-.56507E-12	0.00000	.11015E-11	0.00000	.97105E-14	0.00000	-.31760E+00	0.00000	-.74526E-13	0.00000
.35305E-13	0.00000	.55489E-12	0.00000	-.11749E-13	0.00000	.70071E-12	0.00000	.31760E+00	0.00000	-.83238E-14	0.00000
.46206E-14	0.00000	-.66848E-12	0.00000	-.72155E-12	0.00000	-.11746E-12	0.00000	.17530E-12	0.00000	-.64071E-13	0.00000
.64411E-15	0.00000	.69483E-12	0.00000	-.30959E-12	0.00000	.12193E-11	0.00000	-.16820E-12	0.00000	-.35169E-13	0.00000
.35569E-13	0.00000	.39226E-12	0.00000	-.48810E-12	0.00000	-.65353E-12	0.00000	.31760E+00	0.00000	.39737E-14	0.00000
.33757E-14	0.00000	-.36571E-12	0.00000	.12537E-11	0.00000	-.22286E-12	0.00000	-.31760E+00	0.00000	-.27660E-13	0.00000
.20292E-13	0.00000	.73326E-12	0.00000	-.14574E-11	0.00000	.11592E-11	0.00000	-.19629E+00	0.00000	.42032E-13	0.00000
.18264E-13	0.00000	-.71085E-12	0.00000	-.68538E-13	0.00000						
.34162E-13	0.00000	.70667E-12	0.00000	.84732E-12	0.00000						
.20011E-13	0.00000	-.70753E-12	0.00000	.70524E-12	0.00000	.38398E-12	0.00000	.19629E+00	0.00000	.96272E-14	0.00000
.17571E-13	0.00000	.33072E-12	0.00000	-.31273E-13	0.00000	-.34008E-12	0.00000	.31760E+00	0.00000	-.13835E-13	0.00000
.22330E-14	0.00000	-.35649E-12	0.00000	-.76798E-12	0.00000	-.49774E-12	0.00000	-.31760E+00	0.00000	-.40043E-14	0.00000
.88081E-14	0.00000	-.69152E-12	0.00000	.73438E-12	0.00000	.43207E-12	0.00000	.46985E-12	0.00000	.16302E-13	0.00000
.58715E-14	0.00000	.68340E-12	0.00000	.21092E-12	0.00000	.68494E-12	0.00000	-.45830E-12	0.00000	-.16378E-13	0.00000
.21435E-13	0.00000	-.50962E-12	0.00000	-.41364E-12	0.00000	.27278E-12	0.00000	-.31760E+00	0.00000	-.53051E-14	0.00000
.41335E-14	0.00000	.53341E-12	0.00000	-.63863E-12	0.00000	.39079E-12	0.00000	.31760E+00	0.00000	-.19581E-13	0.00000
.40310E-13	0.00000	.44464E-12	0.00000	.30500E-12	0.00000	-.58009E-12	0.00000	.19629E+00	0.00000	.40963E-13	0.00000
.53204E-14	0.00000	-.46525E-12	0.00000	.77721E-13	0.00000	-.72588E-12	0.00000	-.19629E+00	0.00000	-.51881E-13	0.00000

NATURAL FREQUENCY= .129134E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.11960E-13	0.00000	-.67936E-14	0.00000	-.12769E+00	0.00000	-.87735E-01	0.00000	.48192E-12	0.00000	.58405E-14	0.00000
.28283E-14	0.00000	-.30542E-13	0.00000	.12769E+00	0.00000	.87735E-01	0.00000	-.52011E-12	0.00000	-.14951E-13	0.00000
-.26797E-13	0.00000	.12643E-13	0.00000	-.14283E+00	0.00000	.10531E+00	0.00000	-.66238E-12	0.00000	-.10014E-13	0.00000
-.17830E-13	0.00000	.11803E-13	0.00000	.14283E+00	0.00000	-.10531E+00	0.00000	.70873E-12	0.00000	-.17641E-13	0.00000
-.11603E-13	0.00000	-.29481E-13	0.00000	.99878E-01	0.00000	.20670E+00	0.00000	-.63637E-13	0.00000	-.19991E-14	0.00000
.27501E-13	0.00000	.45804E-13	0.00000	-.99878E-01	0.00000	-.20670E+00	0.00000	.93726E-13	0.00000	-.32847E-14	0.00000
-.12627E-13	0.00000	-.16012E-13	0.00000	.30458E+00	0.00000	.41725E-01	0.00000	.75918E-12	0.00000	.88645E-15	0.00000
-.76489E-15	0.00000	.17172E-13	0.00000	-.30458E+00	0.00000	-.41725E-01	0.00000	-.72148E-12	0.00000	.13839E-13	0.00000
-.92314E-14	0.00000	-.15887E-15	0.00000	.19031E+00	0.00000	-.19031E+00	0.00000	-.42918E-12	0.00000	-.84287E-14	0.00000
.17554E-13	0.00000	-.16653E-13	0.00000	-.19031E+00	0.00000						
.88398E-14	0.00000	-.18121E-13	0.00000	-.19031E+00	0.00000						
-.38485E-13	0.00000	-.35743E-13	0.00000	.19031E+00	0.00000	.19031E+00	0.00000	.38225E-12	0.00000	.17242E-13	0.00000
-.24051E-13	0.00000	.54725E-14	0.00000	-.30458E+00	0.00000	.41725E-01	0.00000	.55325E-12	0.00000	.37176E-13	0.00000
.42571E-13	0.00000	-.15348E-14	0.00000	.30458E+00	0.00000	-.41725E-01	0.00000	-.49105E-12	0.00000	-.41713E-13	0.00000
-.45428E-13	0.00000	.37622E-14	0.00000	-.99878E-01	0.00000	.20670E+00	0.00000	.15410E-12	0.00000	.32168E-14	0.00000
.22563E-13	0.00000	.45724E-14	0.00000	.99878E-01	0.00000	-.20670E+00	0.00000	.40164E-15	0.00000	.41564E-13	0.00000
-.20040E-13	0.00000	-.20570E-13	0.00000	.14283E+00	0.00000	.10531E+00	0.00000	-.53339E-12	0.00000	-.26882E-13	0.00000
.37634E-13	0.00000	.13893E-13	0.00000	-.14283E+00	0.00000	-.10531E+00	0.00000	.53559E-12	0.00000	.51383E-13	0.00000
.11014E-13	0.00000	.34734E-14	0.00000	.12769E+00	0.00000	-.87735E-01	0.00000	.28895E-12	0.00000	.48901E-13	0.00000
.60250E-15	0.00000	-.77106E-14	0.00000	-.12769E+00	0.00000	.87735E-01	0.00000	-.29712E-12	0.00000	-.88790E-13	0.00000

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.29161E-13	0.00000	.75452E-13	0.00000	.20326E+00	0.00000	.35038E-01	0.00000	-.52083E-12	0.00000	-.92660E-13	0.00000
.52764E-13	0.00000	-.30717E-13	0.00000	-.20326E+00	0.00000	-.35038E-01	0.00000	.44475E-12	0.00000	.10564E-12	0.00000
.76536E-14	0.00000	-.11675E-12	0.00000	.20888E+00	0.00000	-.75291E-01	0.00000	.63252E-12	0.00000	.65885E-13	0.00000
.22175E-13	0.00000	.80221E-13	0.00000	-.20888E+00	0.00000	.75291E-01	0.00000	-.72690E-12	0.00000	-.63775E-13	0.00000
.30195E-13	0.00000	-.42618E-13	0.00000	.42646E-01	0.00000	-.18396E+00	0.00000	.13414E-12	0.00000	.12071E-13	0.00000
.21350E-13	0.00000	.16382E-13	0.00000	-.42646E-01	0.00000	.18396E+00	0.00000	.10465E-12	0.00000	-.28189E-13	0.00000
.47995E-13	0.00000	.68399E-13	0.00000	-.18480E+00	0.00000	-.14612E+00	0.00000	-.64403E-12	0.00000	-.58577E-13	0.00000
.58335E-13	0.00000	-.10434E-12	0.00000	.18480E+00	0.00000	.14612E+00	0.00000	.74994E-12	0.00000	.26377E-13	0.00000
.15251E-13	0.00000	.65384E-13	0.00000	-.26999E+00	0.00000	-.44942E-12	0.00000	.40260E-12	0.00000	.33263E-13	0.00000
.49468E-13	0.00000	-.56555E-13	0.00000	.26999E+00	0.00000						
.74992E-14	0.00000	.67283E-13	0.00000	-.26999E+00	0.00000						
.63500E-13	0.00000	-.32829E-13	0.00000	.26999E+00	0.00000	.64615E-12	0.00000	-.38697E-12	0.00000	-.52242E-13	0.00000
.32463E-13	0.00000	-.22985E-13	0.00000	-.18480E+00	0.00000	.14612E+00	0.00000	-.53081E-12	0.00000	-.59175E-13	0.00000
.57675E-13	0.00000	-.31636E-13	0.00000	.18480E+00	0.00000	-.14612E+00	0.00000	.42710E-12	0.00000	.41038E-13	0.00000
.41604E-13	0.00000	-.73382E-13	0.00000	.42646E-01	0.00000	.18396E+00	0.00000	-.18947E-12	0.00000	.31353E-14	0.00000
.25827E-14	0.00000	.49240E-13	0.00000	-.42646E-01	0.00000	-.18396E+00	0.00000	.35750E-13	0.00000	-.76006E-13	0.00000
.60138E-14	0.00000	-.30319E-13	0.00000	.20888E+00	0.00000	.75291E-01	0.00000	.55950E-12	0.00000	.57019E-14	0.00000
-.16771E-13	0.00300	.52023E-13	0.00000	-.20888E+00	0.00000	-.75291E-01	0.00000	-.47790E-12	0.00000	-.92849E-13	0.00000
-.53534E-13	0.00000	.39953E-13	0.00000	.20326E+00	0.00000	-.35039E-01	0.00000	-.21723E-12	0.00000	-.52029E-13	0.00000
.25278E-13	0.00000	-.35479E-13	0.00000	-.20326E+00	0.00000	.35038E-01	0.00000	.28719E-12	0.00000	.79923E-13	0.00000

NATURAL FREQUENCY= .131783E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.10666E+00	0.00000	-.86045E-13	0.00000	-.92997E-13	0.00000	.46898E-13	0.00000	.11406E+00	0.00000	.21429E+00	0.00000
.10666E+00	0.00000	-.28842E-13	0.00000	.11620E-12	0.00000	.25685E-13	0.00000	.11406E+00	0.00000	-.21429E+00	0.00000
.34183E-01	0.00000	.49496E-13	0.00000	-.79406E-13	0.00000	-.94622E-13	0.00000	.88106E-01	0.00000	-.15274E+00	0.00000
-.34183E-01	0.00000	-.48855E-13	0.00000	.98024E-13	0.00000	-.68459E-13	0.00000	.88106E-01	0.00000	.15274E+00	0.00000
.10045E+00	0.00000	.33947E-13	0.00000	-.13042E-12	0.00000	-.42421E-13	0.00000	-.30280E+00	0.00000	-.25308E-01	0.00000
-.10045E+00	0.00000	.44866E-13	0.00000	.12891E-12	0.00000	.62631E-13	0.00000	-.30280E+00	0.00000	.25308E-01	0.00000
.68169E-01	0.00000	-.50486E-14	0.00000	-.10910E-12	0.00000	.73559E-13	0.00000	-.84213E-01	0.00000	.14597E+00	0.00000
-.68169E-01	0.00000	.24082E-13	0.00000	.64574E-13	0.00000	-.10190E-13	0.00000	-.84213E-01	0.00000	-.14597E+00	0.00000
-.96136E-01	0.00000	.90043E-14	0.00000	-.81857E-13	0.00000	-.19445E-13	0.00000	.18485E+00	0.00000	.11867E-11	0.00000
.96136E-01	0.00000	-.56862E-13	0.00000	.58302E-13	0.00000						
-.96136E-01	0.00000	.77822E-14	0.00000	-.12157E-12	0.00000						
.96136E-01	0.00000	-.56006E-13	0.00000	.17033E-12	0.00000	.54814E-13	0.00000	-.18485E+00	0.00000	-.81511E-12	0.00000
.68169E-01	0.00000	.45434E-13	0.00000	-.17314E-12	0.00000	-.52016E-13	0.00000	-.84213E-01	0.00000	-.14597E+00	0.00000
-.68169E-01	0.00000	.15451E-13	0.00000	.18460E-12	0.00000	.37804E-13	0.00000	-.84213E-01	0.00000	.14597E+00	0.00000
.10045E+00	0.00000	-.27627E-13	0.00000	-.18937E-12	0.00000	.44238E-13	0.00000	-.30280E+00	0.00000	.25308E-01	0.00000
-.10045E+00	0.00000	.78875E-13	0.00000	.18508E-12	0.00000	.68648E-13	0.00000	-.30280E+00	0.00000	-.25308E-01	0.00000
.34183E-01	0.00000	-.28453E-13	0.00000	-.17785E-12	0.00000	.25888E-13	0.00000	.88106E-01	0.00000	.15274E+00	0.00000
-.34183E-01	0.00000	.60559E-14	0.00000	.14791E-12	0.00000	.31306E-13	0.00000	.88106E-01	0.00000	-.15274E+00	0.00000
-.10666E+00	0.00000	.30160E-13	0.00000	-.13884E-12	0.00000	-.45739E-13	0.00000	.11406E+00	0.00000	-.21429E+00	0.00000
.10666E+00	0.00000	-.47850E-13	0.00000	.15887E-12	0.00000	-.36843E-14	0.00000	.11406E+00	0.00000	.21429E+00	0.00000

NATURAL FREQUENCY= .131132E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.20643E-13	0.00000	-.54604E-13	0.00000	-.28017E+00	0.00000	-.22623E-02	0.00000	-.18249E-12	0.00000	-.26208E-13	0.00000
.96077E-14	0.00000	.20498E-13	0.00000	.28017E+00	0.00000	.22623E-02	0.00000	.16950E-12	0.00000	-.21620E-13	0.00000
-.19963E-13	0.00000	.91490E-13	0.00000	-.28046E+00	0.00000	.23102E-01	0.00000	.28697E-12	0.00000	-.23784E-13	0.00000
-.46166E-14	0.00000	-.61868E-13	0.00000	.28046E+00	0.00000	-.23102E-01	0.00000	-.29570E-12	0.00000	-.10978E-13	0.00000
-.10401E-13	0.00000	.16311E-13	0.00000	-.23336E+00	0.00000	.66293E-01	0.00000	.94574E-13	0.00000	.24589E-13	0.00000
.29900E-13	0.00000	-.13808E-13	0.00000	.23336E+00	0.00000	-.66293E-01	0.00000	-.57588E-13	0.00000	-.15155E-13	0.00000
-.47220E-13	0.00000	-.51845E-13	0.00000	-.14545E+00	0.00000	.81508E-01	0.00000	-.28283E-12	0.00000	-.91969E-14	0.00000
.18703E-13	0.00000	.37140E-13	0.00000	.14545E+00	0.00000	-.81508E-01	0.00000	.35720E-12	0.00000	.51463E-14	0.00000
.18837E-13	0.00000	-.21910E-13	0.00000	-.67405E-01	0.00000	.67405E-01	0.00000	.14011E-12	0.00000	.17142E-13	0.00000
.19551E-13	0.00000	.64434E-14	0.00000	.67405E-01	0.00000						
-.58959E-13	0.00000	-.15391E-13	0.00000	.67405E-01	0.00000						
.53187E-14	0.00000	.18372E-13	0.00000	-.67405E-01	0.00000	-.67405E-01	0.00000	-.68741E-13	0.00000	.25449E-14	0.00000
.64241E-13	0.00000	.13476E-13	0.00000	.14545E+00	0.00000	.81508E-01	0.00000	-.84909E-13	0.00000	-.57631E-13	0.00000
-.25291E-13	0.00000	-.12173E-13	0.00000	-.14545E+00	0.00000	-.81508E-01	0.00000	.55496E-14	0.00000	.24383E-13	0.00000
.44651E-13	0.00000	.14520E-13	0.00000	.23336E+00	0.00000	.66293E-01	0.00000	-.14076E-12	0.00000	.35975E-14	0.00000
-.50727E-13	0.00000	-.29741E-13	0.00000	-.23336E+00	0.00000	-.66293E-01	0.00000	-.14513E-12	0.00000	-.71783E-13	0.00000
-.16367E-13	0.00000	.14500E-13	0.00000	.28046E+00	0.00000	.23102E-01	0.00000	.99340E-13	0.00000	.10812E-12	0.00000
-.20183E-13	0.00000	-.24876E-13	0.00000	-.28046E+00	0.00000	-.23102E-01	0.00000	.30237E-13	0.00000	-.70198E-13	0.00000
-.19118E-13	0.00000	-.25231E-13	0.00000	.28017E+00	0.00000	-.22623E-02	0.00000	.27172E-13	0.00000	-.10598E-12	0.00000
.75793E-13	0.00000	.28131E-13	0.00000	-.28017E+00	0.00000	.22623E-02	0.00000	.78653E-13	0.00000	.74926E-13	0.00000

NATURAL FREQUENCY= .136237E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.27748E-14	0.00000	-.19527E-01	0.00000	.35496E-01	0.00000	.30667E+00	0.00000	.62218E-13	0.00000	-.17837E-13	0.00000
-.37514E-13	0.00000	.19527E-01	0.00000	.35496E-01	0.00000	.30667E+00	0.00000	-.72065E-13	0.00000	.61450E-13	0.00000
-.11386E-13	0.00000	.21188E+00	0.00000	-.91344E-01	0.00000	-.20451E+00	0.00000	-.33523E-12	0.00000	.18429E-12	0.00000
-.23891E-13	0.00000	-.21188E+00	0.00000	-.91344E-01	0.00000	-.20451E+00	0.00000	.29630E-12	0.00000	.15351E-12	0.00000
-.17951E-13	0.00000	-.35416E-02	0.00000	.10515E+00	0.00000	.40730E-01	0.00000	.49238E-12	0.00000	.13272E-12	0.00000
.46893E-13	0.00000	.35416E-02	0.00000	.10515E+00	0.00000	.40730E-01	0.00000	-.37104E-12	0.00000	.83274E-13	0.00000
-.37639E-13	0.00000	-.18683E+00	0.00000	-.27984E-01	0.00000	.14420E+00	0.00000	-.19011E-12	0.00000	.12482E-12	0.00000
.21590E-13	0.00000	.18683E+00	0.00000	-.27984E-01	0.00000	.14420E+00	0.00000	.34199E-12	0.00000	.14379E-12	0.00000
.61795E-13	0.00000	-.18197E-12	0.00000	-.21320E-01	0.00000	.13042E-12	0.00000	.64494E-14	0.00000	.23544E-13	0.00000
.20362E-13	0.00000	.17285E-12	0.00000	-.21320E-01	0.00000						
-.24576E-13	0.00000	-.15583E-12	0.00000	-.21320E-01	0.00000						
.47280E-13	0.00000	.17095E-12	0.00000	-.21320E-01	0.00000	-.26960E-12	0.00000	-.32893E-14	0.00000	-.17780E-13	0.00000
.20810E-13	0.00000	.18683E+00	0.00000	-.27984E-01	0.00000	-.14420E+00	0.00000	.73436E-13	0.00000	.15638E-13	0.00000
-.24077E-13	0.00000	-.18683E+00	0.00000	-.27984E-01	0.00000	-.14420E+00	0.00000	-.46406E-13	0.00000	.17871E-13	0.00000
.31967E-13	0.00000	.35416E-02	0.00000	.10515E+00	0.00000	-.40730E-01	0.00000	-.86103E-13	0.00000	.34589E-13	0.00000
-.36232E-13	0.00000	-.35416E-02	0.00000	.10515E+00	0.00000	-.40730E-01	0.00000	-.36223E-13	0.00000	.42971E-14	0.00000
-.12455E-13	0.00000	-.21188E+00	0.00000	-.91344E-01	0.00000	.20451E+00	0.00000	.70748E-13	0.00000	.75978E-13	0.00000
-.62238E-14	0.00000	.21188E+00	0.00000	-.91344E-01	0.00000	.20451E+00	0.00000	-.26622E-13	0.00000	-.72573E-14	0.00000
-.40661E-13	0.00000	.19527E-01	0.00000	.35496E-01	0.00000	-.30667E+00	0.00000	.73733E-13	0.00000	.37257E-14	0.00000
.49364E-13	0.00000	-.19527E-01	0.00000	.35496E-01	0.00000	-.30667E+00	0.00000	.68113E-13	0.00000	.41944E-13	0.00000

NATURAL FREQUENCY= .131957E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.20846E-12	0.00000	.71112E-14	0.00000	-.22361E+00	0.00000	.85118E-13	0.00000	-.15841E-12	0.00000	-.39487E-12	0.00000
-.17350E-12	0.00000	.47189E-14	0.00000	.22361E+00	0.00000	-.16510E-13	0.00000	-.24021E-12	0.00000	.34742E-12	0.00000
-.64261E-13	0.00000	.22861E-14	0.00000	-.22361E+00	0.00000	.60814E-13	0.00000	-.19307E-12	0.00000	.23906E-12	0.00000
.65929E-13	0.00000	-.18070E-13	0.00000	.22361E+00	0.00000	-.11469E-12	0.00000	-.11980E-12	0.00000	-.27653E-12	0.00000
.17633E-12	0.00000	-.40693E-13	0.00000	-.22361E+00	0.00000	-.20594E-13	0.00000	.55575E-12	0.00000	.69514E-13	0.00000
.19607E-12	0.00000	.57306E-14	0.00000	.22361E+00	0.00000	.70976E-13	0.00000	.52132E-12	0.00000	-.46648E-13	0.00000
.14415E-12	0.00000	-.59270E-14	0.00000	-.22361E+00	0.00000	-.18520E-12	0.00000	.18716E-12	0.00000	-.25968E-12	0.00000
.13456E-12	0.00000	.11847E-13	0.00000	.22361E+00	0.00000	.17876E-12	0.00000	.12518E-12	0.00000	.20150E-12	0.00000
.19630E-12	0.00000	.20516E-13	0.00000	-.22361E+00	0.00000	.31572E-13	0.00000	-.29147E-12	0.00000	.40502E-13	0.00000
.15248E-12	0.00000	-.38366E-13	0.00000	.22361E+00	0.00000						
.11619E-12	0.00000	.26345E-14	0.00000	-.22361E+00	0.00000						
.15458E-12	0.00000	.11893E-14	0.00000	.22361E+00	0.00000	.14883E-13	0.00000	-.29247E-12	0.00000	-.31190E-13	0.00000
.55358E-13	0.00000	.36648E-13	0.00000	-.22361E+00	0.00000	.14802E-12	0.00000	.10674E-12	0.00000	.17745E-12	0.00000
.93019E-13	0.00000	-.67760E-13	0.00000	.22361E+00	0.00000	-.24494E-12	0.00000	.14088E-12	0.00000	-.23901E-12	0.00000
.12638E-12	0.00000	-.25736E-13	0.00000	-.22361E+00	0.00000	-.14744E-13	0.00000	.39997E-12	0.00000	-.69558E-13	0.00000
.12935E-12	0.00000	.98456E-15	0.00000	.22361E+00	0.00000	-.21340E-13	0.00000	.36752E-12	0.00000	-.43296E-13	0.00000
-.68634E-13	0.00000	-.56157E-13	0.00000	-.22361E+00	0.00000	-.21225E-13	0.00000	-.79705E-13	0.00000	-.19737E-12	0.00000
.24458E-13	0.00000	.61453E-13	0.00000	.22361E+00	0.00000	.14079E-12	0.00000	-.13682E-12	0.00000	.17407E-12	0.00000
.16697E-12	0.00000	.93712E-14	0.00000	-.22361E+00	0.00000	.89414E-13	0.00000	-.19005E-12	0.00000	.26658E-12	0.00000
.13900E-12	0.00000	-.29751E-13	0.00000	.22361E+00	0.00000	-.22079E-12	0.00000	-.14400E-12	0.00000	-.29057E-12	0.00000

NATURAL FREQUENCY= .134445E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.59168E-01	0.00000	-.58622E-13	0.00000	-.96111E-12	0.00000	-.16570E-11	0.00000	.50326E-12	0.00000	-.16347E-01	0.00000
.59168E-01	0.00000	-.49069E-13	0.00000	.93413E-12	0.00000	.17039E-11	0.00000	.48591E-12	0.00000	-.16347E-01	0.00000
.20781E-01	0.00000	.57009E-13	0.00000	-.64668E-12	0.00000	.17242E-11	0.00000	.52018E-12	0.00000	-.31699E+00	0.00000
.20781E-01	0.00000	.32993E-13	0.00000	.66676E-12	0.00000	-.17849E-11	0.00000	.41841E-12	0.00000	-.31699E+00	0.00000
.33738E-02	0.00000	.30117E-13	0.00000	.22764E-11	0.00000	.79398E-12	0.00000	-.13816E-11	0.00000	-.16789E+00	0.00000
.33738E-02	0.00000	.48013E-13	0.00000	-.22284E-11	0.00000	-.76441E-12	0.00000	-.13236E-11	0.00000	-.16789E+00	0.00000
-.13621E-01	0.00000	-.38407E-13	0.00000	.83788E-12	0.00000	-.20440E-11	0.00000	-.46314E-12	0.00000	-.33860E+00	0.00000
-.13621E-01	0.00000	-.21516E-13	0.00000	-.82800E-12	0.00000	.20465E-11	0.00000	-.43395E-12	0.00000	-.33860E+00	0.00000
-.56464E-01	0.00000	-.35323E-13	0.00000	-.15427E-11	0.00000	.25352E-13	0.00000	.60292E-12	0.00000	-.56464E-01	0.00000
-.56464E-01	0.00000	.19158E-13	0.00000	.14545E-11	0.00000						
.56464E-01	0.00000	-.41426E-13	0.00000	-.14931E-11	0.00000						
.56464E-01	0.00000	.20124E-13	0.00000	.15415E-11	0.00000	.41394E-13	0.00000	.57286E-12	0.00000	-.56464E-01	0.00000
.13621E-01	0.00000	.30498E-13	0.00000	.87682E-12	0.00000	.19670E-11	0.00000	-.24713E-12	0.00000	-.33860E+00	0.00000
.13621E-01	0.00000	.31173E-13	0.00000	-.87590E-12	0.00000	-.19960E-11	0.00000	-.16937E-12	0.00000	-.33860E+00	0.00000
-.33738E-02	0.00000	.21569E-13	0.00000	.21863E-11	0.00000	-.84759E-12	0.00000	-.92854E-12	0.00000	-.16789E+00	0.00000
-.33738E-02	0.00000	-.16878E-13	0.00000	-.21826E-11	0.00000	.83236E-12	0.00000	-.81455E-12	0.00000	-.16789E+00	0.00000
-.20781E-01	0.00000	.17778E-13	0.00000	-.62725E-12	0.00000	-.16857E-11	0.00000	.20644E-12	0.00000	-.31699E+00	0.00000
-.20781E-01	0.00000	-.51649E-13	0.00000	.65224E-12	0.00000	.16208E-11	0.00000	.20759E-12	0.00000	-.31699E+00	0.00000
-.59168E-01	0.00000	-.25268E-13	0.00000	-.91746E-12	0.00000	.16651E-11	0.00000	.39644E-12	0.00000	-.16347E-01	0.00000
-.59168E-01	0.00000	-.36301E-13	0.00000	.97955E-12	0.00000	-.15541E-11	0.00000	.29842E-12	0.00000	-.16347E-01	0.00000

NATURAL FREQUENCY= .134626E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.64676E-01	0.00000	.68914E-14	0.00000	.14359E-12	0.00000	.22854E-12	0.00000	-.49887E-12	0.00000	.22759E-01	0.00000
-.64676E-01	0.00000	.54009E-14	0.00000	-.17481E-12	0.00000	-.46886E-12	0.00000	-.50742E-12	0.00000	.22759E-01	0.00000
-.11927E-01	0.00000	-.36675E-13	0.00000	.96688E-13	0.00000	-.23955E-12	0.00000	-.33305E-12	0.00000	.33191E+00	0.00000
-.11927E-01	0.00000	.33494E-13	0.00000	-.50361E-11	0.00000	.34732E-12	0.00000	-.41567E-12	0.00000	.33191E+00	0.00000
-.27648E-02	0.00000	.37099E-13	0.00000	-.42843E-12	0.00000	-.19082E-12	0.00000	.10563E-11	0.00000	.14148E+00	0.00000
-.27648E-02	0.00000	-.44622E-13	0.00000	.37440E-12	0.00000	.47348E-13	0.00000	.10735E-11	0.00000	.14148E+00	0.00000
.19663E-01	0.00000	.22255E-13	0.00000	-.17211E-12	0.00000	.30755E-12	0.00000	.24762E-12	0.00000	.33606E+00	0.00000
.19663E-01	0.00000	-.30443E-13	0.00000	.14373E-12	0.00000	-.33805E-12	0.00000	.31703E-12	0.00000	.33606E+00	0.00000
.59705E-01	0.00000	-.85675E-14	0.00000	.29767E-12	0.00000	-.25017E-13	0.00000	-.45743E-12	0.00000	-.36718E-11	0.00000
.59705E-01	0.00000	-.86157E-15	0.00000	-.22675E-12	0.00000						
.59705E-01	0.00000	-.98212E-14	0.00000	.24998E-12	0.00000						
.59705E-01	0.00000	-.35425E-14	0.00000	-.30199E-12	0.00000	-.41121E-13	0.00000	-.50521E-12	0.00000	-.39688E-11	0.00000
.19663E-01	0.00000	.39108E-13	0.00000	-.11643E-12	0.00000	-.34458E-12	0.00000	-.82122E-13	0.00000	-.33606E+00	0.00000
.19663E-01	0.00000	.70533E-13	0.00000	.15061E-12	0.00000	.41019E-12	0.00000	-.85006E-13	0.00000	-.33606E+00	0.00000
-.27648E-02	0.00000	-.33358E-13	0.00000	-.45417E-12	0.00000	.10562E-12	0.00000	.31370E-12	0.00000	-.14148E+00	0.00000
-.27648E-02	0.00000	-.89965E-14	0.00000	.43726E-12	0.00000	-.82516E-13	0.00000	.38454E-12	0.00000	-.14148E+00	0.00000
-.11927E-01	0.00000	-.87980E-13	0.00000	.90401E-13	0.00000	.38537E-12	0.00000	.88622E-13	0.00000	-.33191E+00	0.00000
-.11927E-01	0.00000	-.41364E-13	0.00000	-.13060E-12	0.00000	-.36792E-12	0.00000	.97279E-13	0.00000	-.33191E+00	0.00000
-.64676E-01	0.00000	.24710E-13	0.00000	.21120E-12	0.00000	-.43031E-12	0.00000	-.27884E-12	0.00000	-.22759E-01	0.00000
-.64676E-01	0.00000	.51984E-13	0.00000	-.16778E-12	0.00000	.27465E-12	0.00000	-.22961E-12	0.00000	-.22759E-01	0.00000

NATURAL FREQUENCY= .130729E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.10203E+00	0.00000	-.23274E-13	0.00000	.29947E-12	0.00000	-.52966E-13	0.00000	.91390E-01	0.00000	.21998E+00	0.00000
.10203E+00	0.00000	.38232E-13	0.00000	-.28382E-12	0.00000	-.18100E-14	0.00000	.91390E-01	0.00000	-.21998E+00	0.00000
.28667E-01	0.00000	.18434E-13	0.00000	.30455E-12	0.00000	-.56793E-13	0.00000	.12827E+00	0.00000	-.13147E+00	0.00000
-.28667E-01	0.00000	-.35671E-14	0.00000	-.28316E-12	0.00000	-.22304E-13	0.00000	.12827E+00	0.00000	.13147E+00	0.00000
.84533E-01	0.00000	-.40641E-13	0.00000	.27769E-12	0.00000	.65203E-13	0.00000	-.29157E+00	0.00000	-.74670E-01	0.00000
-.84533E-01	0.00000	.40661E-13	0.00000	-.25296E-12	0.00000	.46282E-13	0.00000	-.29157E+00	0.00000	.74670E-01	0.00000
.13365E+00	0.00000	.18754E-13	0.00000	.19969E-12	0.00000	-.22354E-13	0.00000	-.11612E+00	0.00000	.12515E+00	0.00000
-.13385E+00	0.00000	.11690E-13	0.00000	-.25490E-12	0.00000	.43560E-13	0.00000	-.11612E+00	0.00000	-.12515E+00	0.00000
-.93315E-01	0.00000	.69812E-14	0.00000	.16439E-12	0.00000	-.89667E-13	0.00000	.18511E-11	0.00000	-.93315E-01	0.00000
.93315E-01	0.00000	-.39837E-13	0.00000	-.15089E-12	0.00000						
.93315E-01	0.00000	.98526E-14	0.00000	-.15769E-13	0.00000						
-.93315E-01	0.00000	-.39874E-13	0.00000	-.30448E-13	0.00000	.63569E-13	0.00000	.16898E-11	0.00000	.93315E-01	0.00000
-.13385E+00	0.00000	-.40310E-13	0.00000	.32164E-14	0.00000	-.54966E-13	0.00000	.11612E+00	0.00000	.12515E+00	0.00000
.13365E+00	0.00000	.32245E-13	0.00000	.67390E-13	0.00000	.12872E-12	0.00000	.11612E+00	0.00000	-.12515E+00	0.00000
-.84533E-01	0.00000	-.22236E-13	0.00000	-.16035E-12	0.00000	-.14402E-12	0.00000	.29157E+00	0.00000	-.74670E-01	0.00000
.84533E-01	0.00000	.34768E-13	0.00000	.19422E-12	0.00000	.10421E-12	0.00000	.29157E+00	0.00000	.74670E-01	0.00000
-.28667E-01	0.00000	-.54870E-13	0.00000	-.28661E-12	0.00000	.31960E-13	0.00000	-.12827E+00	0.00000	-.13147E+00	0.00000
.28667E-01	0.00000	.51730E-13	0.00000	.10354E-12	0.00000	.77610E-13	0.00000	-.12827E+00	0.00000	.13147E+00	0.00000
.10203E+00	0.00000	.94269E-14	0.00000	-.19512E-12	0.00000	-.57129E-13	0.00000	-.91390E-01	0.00000	.21998E+00	0.00000
-.10203E+00	0.00000	-.23518E-13	0.00000	.23495E-12	0.00000	-.31531E-13	0.00000	-.91390E-01	0.00000	-.21998E+00	0.00000

NATURAL FREQUENCY= .137419E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.11549E-13	0.00000	-.12058E-13	0.00000	-.11069E+00	0.00000	-.20222E+00	0.00000	.21155E-12	0.00000	.26139E-13	0.00000
-.17765E-13	0.00000	-.22718E-13	0.00000	.11069E+00	0.00000	.20222E+00	0.00000	-.19054E-12	0.00000	-.11619E-13	0.00000
-.20169E-13	0.00000	-.23037E-12	0.00000	-.41866E-01	0.00000	.21444E+00	0.00000	-.51315E-12	0.00000	.43171E-14	0.00000
-.36277E-13	0.00000	.23638E-12	0.00000	.41866E-01	0.00000	-.21444E+00	0.00000	.47170E-12	0.00000	.35026E-13	0.00000
-.10578E-13	0.00000	.29733E-13	0.00000	.24688E+00	0.00000	-.37057E-02	0.00000	.54418E-12	0.00000	.12070E-12	0.00000
-.86569E-14	0.00000	-.42398E-14	0.00000	-.24688E+00	0.00000	.37057E-02	0.00000	-.52527E-12	0.00000	.11373E-13	0.00000
-.14473E-13	0.00000	.22536E-12	0.00000	-.47768E-01	0.00000	-.24271E+00	0.00000	-.32276E-12	0.00000	.82107E-13	0.00000
.21941E-13	0.00000	-.20527E-12	0.00000	.47768E-01	0.00000	.24271E+00	0.00000	.40968E-12	0.00000	.89763E-13	0.00000
.15209E-13	0.00000	.23464E-13	0.00000	-.15714E+00	0.00000	.15714E+00	0.00000	-.88453E-14	0.00000	.40897E-13	0.00000
-.42153E-14	0.00000	.12386E-13	0.00000	.15714E+00	0.00000						
-.23396E-13	0.00000	-.21864E-14	0.00000	.15714E+00	0.00000						
-.26179E-13	0.00000	.21526E-13	0.00000	-.15714E+00	0.00000	-.15714E+00	0.00000	-.20380E-14	0.00000	.16024E-13	0.00000
.12278E-13	0.00000	-.24905E-12	0.00000	.47768E-01	0.00000	-.24271E+00	0.00000	.27347E-12	0.00000	.14792E-12	0.00000
-.18932E-13	0.00000	.20730E-12	0.00000	-.47768E-01	0.00000	.24271E+00	0.00000	-.31447E-12	0.00000	.17577E-12	0.00000
-.18544E-13	0.00000	-.92923E-16	0.00000	-.24688E+00	0.00000	-.37057E-02	0.00000	-.48788E-12	0.00000	.50765E-13	0.00000
.11235E-13	0.00000	-.85037E-14	0.00000	.24688E+00	0.00000	.37057E-02	0.00000	.49569E-12	0.00000	.19434E-13	0.00000
-.22679E-13	0.00000	.27867E-12	0.00000	.41866E-01	0.00000	.21444E+00	0.00000	.45948E-12	0.00000	.50215E-13	0.00000
.27515E-13	0.00000	-.26230E-12	0.00000	-.41866E-01	0.00000	-.21444E+00	0.00000	-.37956E-12	0.00000	.12978E-12	0.00000
.16292E-13	0.00000	-.18974E-13	0.00000	.11069E+00	0.00000	-.20222E+00	0.00000	-.20577E-12	0.00000	.21259E-13	0.00000
-.64263E-14	0.00000	.18115E-14	0.00000	-.11069E+00	0.00000	.20222E+00	0.00000	.16045E-12	0.00000	-.28056E-13	0.00000

NATURAL FREQUENCY= .138786E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.25427E-13	0.00000	-.57698E-13	0.00000	.77477E-14	0.00000	.75709E-13	0.00000	-.99105E-01	0.00000	.14953E-13	0.00000
-.61354E-13	0.00000	-.21139E-13	0.00000	.47316E-13	0.00000	.17198E-12	0.00000	.99105E-01	0.00000	.67633E-13	0.00000
.35240E-13	0.00000	.83486E-13	0.00000	-.80509E-13	0.00000	-.93271E-13	0.00000	.25946E+00	0.00000	.14382E-12	0.00000
.49276E-13	0.00000	-.85041E-13	0.00000	-.39881E-14	0.00000	-.11966E-12	0.00000	-.25946E+00	0.00000	.65679E-13	0.00000
-.32196E-15	0.00000	-.15822E-13	0.00000	.90931E-13	0.00000	.27804E-13	0.00000	-.32071E+00	0.00000	-.20835E-12	0.00000
.65054E-13	0.00000	.19770E-13	0.00000	.82381E-13	0.00000	.41462E-14	0.00000	.32071E+00	0.00000	-.21666E-12	0.00000
-.65454E-13	0.00000	-.72091E-13	0.00000	-.78866E-13	0.00000	.30064E-13	0.00000	.25946E+00	0.00000	-.74508E-13	0.00000
-.35093E-13	0.00000	.76834E-13	0.00000	-.11261E-13	0.00000	.94807E-13	0.00000	-.25946E+00	0.00000	-.28228E-13	0.00000
-.24502E-13	0.00000	.17939E-14	0.00000	-.47035E-13	0.00000	-.81023E-14	0.00000	-.99105E-01	0.00000	-.18242E-14	0.00000
-.86911E-14	0.00000	-.39229E-13	0.00000	.88497E-13	0.00000						
-.20094E-13	0.00000	.56958E-14	0.00000	-.52492E-13	0.00000						
.14663E-13	0.00000	-.22543E-13	0.00000	-.62458E-14	0.00000	-.50977E-13	0.00000	.99105E-01	0.00000	-.27304E-14	0.00000
.43307E-15	0.00000	.45567E-14	0.00000	.99211E-13	0.00000	.41006E-13	0.00000	.25946E+00	0.00000	.16151E-13	0.00000
.20830E-13	0.00000	-.15752E-13	0.00000	-.23843E-13	0.00000	-.76276E-13	0.00000	-.25946E+00	0.00000	.22896E-13	0.00000
-.34519E-13	0.00000	-.11384E-13	0.00000	.60654E-13	0.00000	-.25048E-13	0.00000	-.32071E+00	0.00000	-.55259E-13	0.00000
.12892E-13	0.00000	-.62547E-15	0.00000	-.97436E-13	0.00000	.60085E-13	0.00000	.32071E+00	0.00000	-.88019E-13	0.00000
-.22934E-13	0.00000	.60395E-14	0.00000	.57176E-13	0.00000	-.36749E-13	0.00000	.25946E+00	0.00000	.63256E-13	0.00000
.13172E-13	0.00000	-.93593E-14	0.00000	.67708E-14	0.00000	.32673E-13	0.00000	-.25946E+00	0.00000	.11381E-12	0.00000
.54001E-13	0.00000	-.33359E-13	0.00000	-.77461E-14	0.00000	.55642E-13	0.00000	-.99105E-01	0.00000	.16261E-13	0.00000
.17753E-13	0.00000	.11476E-13	0.00000	-.26782E-13	0.00000	-.16577E-13	0.00000	.99105E-01	0.00000	.20448E-13	0.00000

NATURAL FREQUENCY= .139958E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.54223E-01	0.00000	.41358E-13	0.00000	.49305E-13	0.00000	-.92407E-13	0.00000	.25746E-12	0.00000	.66226E-01	0.00000
-.54228E-01	0.00000	.29814E-13	0.00000	-.11494E-14	0.00000	.24054E-13	0.00000	.23639E-12	0.00000	.66226E-01	0.00000
.11450E+00	0.00000	-.21983E-13	0.00000	.32542E-13	0.00000	.10027E-12	0.00000	-.27579E-12	0.00000	.13424E+00	0.00000
.11450E+00	0.00000	.83051E-14	0.00000	-.60557E-14	0.00000	-.50429E-13	0.00000	-.30388E-12	0.00000	.13424E+00	0.00000
.12503E-01	0.00000	.28590E-13	0.00000	.78511E-13	0.00000	-.62387E-13	0.00000	-.79326E-13	0.00000	-.44262E+00	0.00000
.12503E-01	0.00000	-.61158E-13	0.00000	-.12238E-12	0.00000	-.23005E-13	0.00000	-.20693E-12	0.00000	-.44262E+00	0.00000
-.11450E+00	0.00000	.17756E-13	0.00000	.67424E-14	0.00000	-.19963E-13	0.00000	.40353E-12	0.00000	.74119E-01	0.00000
-.11450E+00	0.00000	.23250E-13	0.00000	.77337E-14	0.00000	.81358E-13	0.00000	.41983E-12	0.00000	.74119E-01	0.00000
.47721E-01	0.00000	-.31036E-13	0.00000	.46817E-13	0.00000	-.40052E-13	0.00000	-.53477E-13	0.00000	.47721E-01	0.00000
.47721E-01	0.00000	.35300E-13	0.00000	-.23261E-13	0.00000						
-.47721E-01	0.00000	-.33557E-13	0.00000	-.24577E-13	0.00000						
-.47721E-01	0.00000	.32902E-13	0.00000	.13792E-13	0.00000	.21213E-13	0.00000	.10130E-13	0.00000	.47721E-01	0.00000
.11450E+00	0.00000	-.61567E-14	0.00000	.19971E-13	0.00000	-.32212E-13	0.00000	-.39753E-12	0.00000	.74119E-01	0.00000
.11450E+00	0.00000	-.46852E-13	0.00000	-.38496E-13	0.00000	-.56982E-13	0.00000	-.30586E-12	0.00000	.74119E-01	0.00000
-.12503E-01	0.00000	-.11072E-13	0.00000	.10852E-13	0.00000	-.63664E-13	0.00000	.22780E-12	0.00000	-.44262E+00	0.00000
-.12503E-01	0.00000	-.65148E-14	0.00000	.30618E-13	0.00000	.73156E-13	0.00000	.17152E-12	0.00000	-.44262E+00	0.00000
-.11450E+00	0.00000	-.14828E-13	0.00000	-.27713E-13	0.00000	.58655E-13	0.00000	.24870E-12	0.00000	.13424E+00	0.00000
-.11450E+00	0.00000	.25055E-13	0.00000	.40276E-14	0.00000	-.18783E-13	0.00000	.23850E-12	0.00000	.13424E+00	0.00000
.54228E-01	0.00000	-.27792E-13	0.00000	.34160E-13	0.00000	-.55583E-13	0.00000	-.30344E-12	0.00000	.66226E-01	0.00000
.54229E-01	0.00000	.37466E-13	0.00000	-.24990E-13	0.00000	-.33049E-14	0.00000	-.34400E-12	0.00000	.66226E-01	0.00000

NATURAL FREQUENCY= .141732E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.11948E-13	0.00000	-.71365E-01	0.00000	-.22500E-01	0.00000	-.30058E+00	0.00000	.53363E-14	0.00000	.66596E-14	0.00000
.81535E-14	0.00000	.71365E-01	0.00000	-.22500E-01	0.00000	-.30058E+00	0.00000	-.20562E-13	0.00000	-.27004E-13	0.00000
.28111E-14	0.00000	-.15195E+00	0.00000	.32158E-01	0.00000	.19759E+00	0.00000	.72647E-13	0.00000	-.40179E-13	0.00000
.29379E-13	0.00000	.15195E+00	0.00000	.32158E-01	0.00000	.19759E+00	0.00000	-.57013E-13	0.00000	-.28200E-13	0.00000
.23645E-13	0.00000	.14946E+00	0.00000	-.55878E-01	0.00000	-.21796E+00	0.00000	-.19761E-12	0.00000	-.78279E-13	0.00000
.35649E-14	0.00000	-.14946E+00	0.00000	-.55878E-01	0.00000	-.21796E+00	0.00000	.14400E-12	0.00000	-.15120E-13	0.00000
.31088E-13	0.00000	.59539E-01	0.00000	.36042E-01	0.00000	-.13972E-01	0.00000	.15751E-12	0.00000	-.76095E-13	0.00000
.21487E-13	0.00000	-.59539E-01	0.00000	.36042E-01	0.00000	-.13972E-01	0.00000	-.28282E-12	0.00000	-.91334E-13	0.00000
.46782E-13	0.00000	-.13812E+00	0.00000	.46691E-01	0.00000	-.46691E-01	0.00000	-.18646E-13	0.00000	-.10389E-13	0.00000
.67303E-14	0.00000	.13812E+00	0.00000	.46691E-01	0.00000						
.54662E-13	0.00000	-.13812E+00	0.00000	-.46691E-01	0.00000						
.73950E-13	0.00000	.13812E+00	0.00000	-.46691E-01	0.00000	-.46691E-01	0.00000	.15590E-12	0.00000	-.40927E-13	0.00000
.12050E-12	0.00000	.59539E-01	0.00000	-.36042E-01	0.00000	-.13972E-01	0.00000	-.61031E-13	0.00000	-.11077E-12	0.00000
.77263E-13	0.00000	-.59539E-01	0.00000	-.36042E-01	0.00000	-.13972E-01	0.00000	-.46142E-12	0.00000	.22864E-13	0.00000
.38055E-13	0.00000	.14946E+00	0.00000	.55878E-01	0.00000	-.21796E+00	0.00000	-.15273E-12	0.00000	.17897E-12	0.00000
.30990E-13	0.00000	-.14946E+00	0.00000	.55878E-01	0.00000	-.21796E+00	0.00000	.25002E-12	0.00000	-.26274E-12	0.00000
.78884E-13	0.00000	-.15195E+00	0.00000	-.32158E-01	0.00000	.19759E+00	0.00000	.37584E-12	0.00000	-.72977E-13	0.00000
.84040E-13	0.00000	.15195E+00	0.00000	-.32158E-01	0.00000	.19759E+00	0.00000	-.94313E-13	0.00000	.12407E-12	0.00000
.77366E-13	0.00000	-.71365E-01	0.00000	.22500E-01	0.00000	-.30058E+00	0.00000	-.22380E-12	0.00000	.90001E-13	0.00000
.44770E-13	0.00000	.71365E-01	0.00000	.22500E-01	0.00000	-.30058E+00	0.00000	-.47448E-13	0.00000	-.11042E-12	0.00000

NATURAL FREQUENCY= .141040E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.60583E-01	0.00000	-.32878E-13	0.00000	.35018E-13	0.00000	-.12970E-12	0.00000	-.57790E-11	0.00000	-.19797E-01	0.00000
.60583E-01	0.00000	.49348E-13	0.00000	-.19590E-13	0.00000	-.55043E-13	0.00000	-.58140E-11	0.00000	-.19797E-01	0.00000
.61010E-02	0.00000	-.64048E-13	0.00000	.15601E-13	0.00000	.70043E-13	0.00000	.63812E-11	0.00000	-.34460E+00	0.00000
.61010E-02	0.00000	.55861E-14	0.00000	-.27882E-14	0.00000	.79939E-14	0.00000	.64237E-11	0.00000	-.34460E+00	0.00000
-.14329E+00	0.00000	.25623E-13	0.00000	-.12857E-13	0.00000	-.39663E-13	0.00000	.33226E-11	0.00000	.32931E-01	0.00000
-.14329E+00	0.00000	-.67802E-13	0.00000	-.42303E-13	0.00000	-.11745E-12	0.00000	.33301E-11	0.00000	.32931E-01	0.00000
.25451E-01	0.00000	.34327E-13	0.00000	.13421E-13	0.00000	.41669E-13	0.00000	-.93782E-11	0.00000	.32800E+00	0.00000
.25451E-01	0.00000	.36967E-13	0.00000	.56709E-13	0.00000	.23252E-13	0.00000	-.93319E-11	0.00000	.32800E+00	0.00000
.51157E-01	0.00000	-.82846E-14	0.00000	.25762E-13	0.00000	.19685E-15	0.00000	.36852E-12	0.00000	-.57888E-11	0.00000
.51157E-01	0.00000	.37930E-13	0.00000	-.15200E-13	0.00000						
.51157E-01	0.00000	-.82466E-14	0.00000	.19926E-13	0.00000						
.51157E-01	0.00000	.40536E-13	0.00000	-.51125E-13	0.00000	-.19126E-13	0.00000	.33163E-12	0.00000	-.11086E-11	0.00000
.25451E-01	0.00000	-.47507E-13	0.00000	-.51354E-13	0.00000	.28313E-13	0.00000	.84172E-11	0.00000	-.32800E+00	0.00000
.25451E-01	0.00000	-.46365E-13	0.00000	.14765E-13	0.00000	.51400E-14	0.00000	.83616E-11	0.00000	-.32800E+00	0.00000
-.14329E+00	0.00000	.69773E-13	0.00000	.20492E-13	0.00000	-.91182E-13	0.00000	-.31992E-11	0.00000	-.32931E-01	0.00000
-.14329E+00	0.00000	-.62327E-13	0.00000	.19567E-13	0.00000	-.15332E-12	0.00000	-.32478E-11	0.00000	-.32931E-01	0.00000
.61010E-02	0.00000	.19643E-13	0.00000	-.51182E-14	0.00000	.46034E-13	0.00000	-.56812E-11	0.00000	.34460E+00	0.00000
.61010E-02	0.00000	.13264E-12	0.00000	-.11666E-13	0.00000	.12445E-12	0.00000	-.56484E-11	0.00000	.34460E+00	0.00000
.60583E-01	0.00000	-.87458E-13	0.00000	.10667E-13	0.00000	-.94788E-13	0.00000	.52529E-11	0.00000	.19797E-01	0.00000
.60583E-01	0.00000	-.18411E-13	0.00000	.19062E-13	0.00000	-.12524E-12	0.00000	.53464E-11	0.00000	.19797E-01	0.00000

NATURAL FREQUENCY= .142730E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.83457E-01	0.00000	-.77332E-12	0.00000	.76063E-13	0.00000	.16731E-12	0.00000	.13738E+00	0.00000	.12548E+00	0.00000
.83457E-01	0.00000	-.82088E-12	0.00000	-.11132E-13	0.00000	-.20684E-13	0.00000	.13738E+00	0.00000	-.12548E+00	0.00000
.85901E-01	0.00000	.11277E-11	0.00000	-.44672E-14	0.00000	-.14529E-12	0.00000	-.16856E+00	0.00000	-.14557E+00	0.00000
-.85901E-01	0.00000	.11004E-11	0.00000	-.65250E-13	0.00000	.11442E-12	0.00000	-.16856E+00	0.00000	.14557E+00	0.00000
.14424E-01	0.00000	.35994E-12	0.00000	-.12496E-13	0.00000	.14760E-12	0.00000	-.50298E-01	0.00000	.26700E+00	0.00000
-.14424E-01	0.00000	.42987E-12	0.00000	.88487E-13	0.00000	-.73546E-13	0.00000	-.50298E-01	0.00000	-.26700E+00	0.00000
-.89379E-01	0.00000	-.12342E-11	0.00000	.62888E-13	0.00000	-.45268E-13	0.00000	.22771E+00	0.00000	-.85935E-01	0.00000
.89379E-01	0.00000	-.12320E-11	0.00000	-.12741E-12	0.00000	.75801E-14	0.00000	.22771E+00	0.00000	.85935E-01	0.00000
.72511E-01	0.00000	.49835E-13	0.00000	-.57496E-13	0.00000	.41183E-14	0.00000	-.14623E+00	0.00000	-.10736E-12	0.00000
-.72511E-01	0.00000	-.36080E-13	0.00000	.48154E-13	0.00000						
.72511E-01	0.00000	.49799E-13	0.00000	-.47983E-13	0.00000						
-.72511E-01	0.00000	-.38954E-13	0.00000	.99814E-13	0.00000	.23759E-13	0.00000	-.14623E+00	0.00000	.31977E-12	0.00000
-.89379E-01	0.00000	.11892E-11	0.00000	.50919E-13	0.00000	.78696E-13	0.00000	.22771E+00	0.00000	.85935E-01	0.00000
.89379E-01	0.00000	.12492E-11	0.00000	-.10735E-12	0.00000	.15862E-13	0.00000	.22771E+00	0.00000	-.85935E-01	0.00000
.14424E-01	0.00000	-.41817E-12	0.00000	-.30413E-13	0.00000	-.13552E-12	0.00000	-.50298E-01	0.00000	-.26700E+00	0.00000
-.14424E-01	0.00000	-.42214E-12	0.00000	.18828E-13	0.00000	.12146E-12	0.00000	-.50298E-01	0.00000	.26700E+00	0.00000
.85901E-01	0.00000	-.10525E-11	0.00000	-.23393E-13	0.00000	.45484E-13	0.00000	-.16856E+00	0.00000	.14557E+00	0.00000
-.85901E-01	0.00000	-.11179E-11	0.00000	.36006E-13	0.00000	-.13030E-12	0.00000	-.16856E+00	0.00000	-.14557E+00	0.00000
-.83457E-01	0.00000	.81704E-12	0.00000	.56739E-13	0.00000	-.68708E-13	0.00000	.13738E+00	0.00000	-.12548E+00	0.00000
.83457E-01	0.00000	.80090E-12	0.00000	-.29756E-13	0.00000	.77289E-13	0.00000	.13738E+00	0.00000	.12548E+00	0.00000

NATURAL FREQUENCY= .137880E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.11154E-13	0.00000	-.25984E-13	0.00000	-.87209E-13	0.00000	.11035E-12	0.00000	-.11401E+00	0.00000	.12648E-13	0.00000
-.81970E-14	0.00000	.35636E-13	0.00000	.12777E-12	0.00000	.45658E-12	0.00000	.11401E+00	0.00000	.80059E-14	0.00000
-.11058E-13	0.00000	.18470E-12	0.00000	-.12898E-12	0.00000	-.25039E-13	0.00000	.28868E+00	0.00000	.28156E-13	0.00000
.61943E-14	0.00000	-.24050E-12	0.00000	-.88311E-14	0.00000	-.38482E-12	0.00000	-.28868E+00	0.00000	-.22048E-13	0.00000
-.20905E-13	0.00000	.15987E-13	0.00000	.30974E-12	0.00000	.37935E-13	0.00000	-.32827E+00	0.00000	-.15235E-13	0.00000
.53800E-13	0.00000	-.42822E-13	0.00000	-.12334E-12	0.00000	-.36952E-13	0.00000	.32827E+00	0.00000	-.56199E-13	0.00000
-.42878E-13	0.00000	-.16299E-12	0.00000	.42474E-14	0.00000	-.54327E-13	0.00000	.21426E+00	0.00000	-.75961E-13	0.00000
.19936E-13	0.00000	.23476E-12	0.00000	.34113E-13	0.00000	.37278E-12	0.00000	-.21426E+00	0.00000	-.65088E-13	0.00000
-.70526E-13	0.00000	-.52282E-13	0.00000	-.16169E-12	0.00000	.19001E-12	0.00000	.32718E-12	0.00000	-.37760E-15	0.00000
.68765E-14	0.00000	.17160E-13	0.00000	.66689E-13	0.00000						
-.43850E-13	0.00000	-.26918E-13	0.00000	.18239E-12	0.00000						
.43741E-13	0.00000	.40086E-13	0.00000	-.18353E-12	0.00000	-.14375E-12	0.00000	-.21634E-12	0.00000	.36943E-14	0.00000
-.21746E-13	0.00000	.22243E-12	0.00000	-.31359E-13	0.00000	-.48095E-12	0.00000	-.21426E+00	0.00000	-.51107E-15	0.00000
.44577E-13	0.00000	-.30995E-12	0.00000	-.11646E-12	0.00000	.55608E-13	0.00000	.21426E+00	0.00000	.87763E-13	0.00000
.20274E-14	0.00000	.62386E-13	0.00000	-.73042E-13	0.00000	-.10295E-12	0.00000	.32827E+00	0.00000	-.79843E-13	0.00000
.86539E-14	0.00000	-.35953E-13	0.00000	.43977E-12	0.00000	-.11772E-12	0.00000	-.32827E+00	0.00000	-.79425E-13	0.00000
-.29074E-13	0.00000	-.27583E-12	0.00000	-.95876E-13	0.00000	.56255E-12	0.00000	-.28868E+00	0.00000	.12032E-13	0.00000
.51935E-14	0.00000	.34545E-12	0.00000	-.21759E-12	0.00000	.11656E-12	0.00000	.28868E+00	0.00000	-.17942E-13	0.00000
.12625E-13	0.00000	-.17434E-13	0.00000	.16245E-12	0.00000	-.72144E-12	0.00000	.11401E+00	0.00000	-.22589E-13	0.00000
.18454E-13	0.00000	-.35849E-13	0.00000	-.56794E-13	0.00000	-.29390E-12	0.00000	-.11401E+00	0.00000	.52092E-13	0.00000

NATURAL FREQUENCY= .139491E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.43380E-01	0.00000	-.67321E-13	0.00000	-.21741E-13	0.00000	-.76730E-13	0.00000	-.22638E-12	0.00000	-.65684E-01	0.00000
.43380E-01	0.00000	.17087E-13	0.00000	.19080E-13	0.00000	.10021E-13	0.00000	-.14972E-13	0.00000	-.65684E-01	0.00000
-.12138E+00	0.00000	.46444E-13	0.00000	.52860E-13	0.00000	.37569E-13	0.00000	.13508E-12	0.00000	-.62940E-01	0.00000
-.12138E+00	0.00000	.65006E-13	0.00000	-.10784E-12	0.00000	-.23574E-13	0.00000	-.17965E-12	0.00000	-.62940E-01	0.00000
.15829E-01	0.00000	-.23026E-13	0.00000	.22931E-13	0.00000	-.10778E-13	0.00000	-.98800E-13	0.00000	.45321E+00	0.00000
.15829E-01	0.00000	-.31232E-13	0.00000	-.64574E-13	0.00000	.11634E-13	0.00000	.31907E-12	0.00000	.45321E+00	0.00000
.99713E-01	0.00000	-.65902E-13	0.00000	.33924E-13	0.00000	.50527E-13	0.00000	.90676E-13	0.00000	-.11667E+00	0.00000
.99713E-01	0.00000	-.73507E-13	0.00000	.23068E-13	0.00000	-.73581E-14	0.00000	-.22097E-12	0.00000	-.11667E+00	0.00000
-.37548E-01	0.00000	.78539E-13	0.00000	.40830E-13	0.00000	-.41488E-13	0.00000	-.11437E-12	0.00000	-.59656E-12	0.00000
-.37548E-01	0.00000	.13158E-13	0.00000	-.39471E-13	0.00000						
-.37548E-01	0.00000	.75176E-13	0.00000	-.34810E-13	0.00000						
-.37548E-01	0.00000	.10670E-13	0.00000	.27860E-13	0.00000	.34697E-13	0.00000	-.89384E-13	0.00000	-.37237E-12	0.00000
.99713E-01	0.00000	-.28342E-13	0.00000	.22738E-13	0.00000	.16165E-13	0.00000	.36130E-12	0.00000	.11667E+00	0.00000
.99713E-01	0.00000	-.67174E-13	0.00000	-.26967E-13	0.00000	-.39965E-13	0.00000	.19587E-12	0.00000	.11667E+00	0.00000
.15829E-01	0.00000	-.17354E-13	0.00000	.92561E-14	0.00000	-.28187E-13	0.00000	-.82972E-13	0.00000	-.45321E+00	0.00000
.15829E-01	0.00000	-.12353E-13	0.00000	-.83880E-14	0.00000	.84376E-13	0.00000	.10600E-12	0.00000	-.45321E+00	0.00000
-.12138E+00	0.00000	.95994E-13	0.00000	-.37409E-13	0.00000	-.62656E-14	0.00000	-.25070E-12	0.00000	.62940E-01	0.00000
-.12138E+00	0.00000	.70862E-14	0.00000	.17998E-13	0.00000	-.72990E-13	0.00000	-.32996E-12	0.00000	.62940E-01	0.00000
.43380E-01	0.00000	.23583E-13	0.00000	.33053E-13	0.00000	.33978E-13	0.00000	.10891E-12	0.00000	.65684E-01	0.00000
.43380E-01	0.00000	-.47335E-13	0.00000	-.22280E-13	0.00000	.10426E-12	0.00000	.16505E-12	0.00000	.65684E-01	0.00000

NATURAL FREQUENCY= .140861E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.55416E-01	0.00000	.68272E-14	0.00000	.56825E-14	0.00000	.14698E-12	0.00000	-.21441E-11	0.00000	-.10970E-01	0.00000
.55416E-01	0.00000	-.14043E-13	0.00000	.22253E-13	0.00000	.84469E-13	0.00000	-.20133E-11	0.00000	-.10970E-01	0.00000
.24061E-01	0.00000	.32404E-13	0.00000	.81769E-14	0.00000	-.10477E-12	0.00000	.23827E-11	0.00000	-.33985E+00	0.00000
.24061E-01	0.00000	-.65344E-13	0.00000	.15558E-14	0.00000	-.38277E-13	0.00000	.23128E-11	0.00000	-.33985E+00	0.00000
-.14223E+00	0.00000	-.46283E-13	0.00000	-.15139E-13	0.00000	.12632E-12	0.00000	.11458E-11	0.00000	-.41965E-01	0.00000
-.14223E+00	0.00000	.47271E-14	0.00000	.35980E-13	0.00000	.78448E-13	0.00000	.11502E-11	0.00000	-.41965E-01	0.00000
-.34906E-03	0.00000	.55668E-13	0.00000	-.20696E-13	0.00000	-.52118E-13	0.00000	-.32473E-11	0.00000	.33288E+00	0.00000
-.34906E-03	0.00000	.85721E-14	0.00000	-.47758E-13	0.00000	.25309E-14	0.00000	-.32924E-11	0.00000	.33288E+00	0.00000
.50989E-01	0.00000	.27438E-13	0.00000	-.29504E-13	0.00000	-.12705E-13	0.00000	.25621E-12	0.00000	.50989E-01	0.00000
.50989E-01	0.00000	-.40765E-13	0.00000	-.50778E-14	0.00000						
-.50989E-01	0.00000	.27469E-13	0.00000	-.47043E-13	0.00000						
-.50989E-01	0.00000	-.37798E-13	0.00000	.47603E-13	0.00000	.28050E-13	0.00000	.21969E-12	0.00000	.50989E-01	0.00000
.34906E-03	0.00000	.83040E-14	0.00000	.89884E-13	0.00000	-.12139E-13	0.00000	.26040E-11	0.00000	.33288E+00	0.00000
.34906E-03	0.00000	.64190E-13	0.00000	-.88518E-14	0.00000	-.41843E-13	0.00000	.25747E-11	0.00000	.33288E+00	0.00000
.14223E+00	0.00000	-.11533E-12	0.00000	-.45813E-13	0.00000	.70039E-13	0.00000	-.11934E-11	0.00000	-.41965E-01	0.00000
.14223E+00	0.00000	.77413E-13	0.00000	-.12696E-13	0.00000	.17324E-12	0.00000	-.12056E-11	0.00000	-.41965E-01	0.00000
-.24061E-01	0.00000	.38831E-13	0.00000	-.19860E-13	0.00000	-.48919E-13	0.00000	-.18929E-11	0.00000	-.33985E+00	0.00000
-.24061E-01	0.00000	-.10468E-12	0.00000	.90915E-15	0.00000	-.13699E-12	0.00000	-.18505E-11	0.00000	-.33985E+00	0.00000
-.55416E-01	0.00000	.53900E-13	0.00000	.24161E-13	0.00000	.12709E-12	0.00000	.16565E-11	0.00000	-.10970E-01	0.00000
-.55416E-01	0.00000	-.28319E-13	0.00000	-.75939E-14	0.00000	.18837E-12	0.00000	.17102E-11	0.00000	-.10970E-01	0.00000

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NATURAL FREQUENCY= .14856/E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.44913E-13	0.00000	-.37672E-12	0.00000	-.12644E+00	0.00000	-.19822E+00	0.00000	-.13866E-13	0.00000	.54616E-13	0.00000
-.43400E-13	0.00000	.16968E-13	0.00000	.12644E+00	0.00000	.19822E+00	0.00000	.12746E-13	0.00000	-.42511E-13	0.00000
.56862E-13	0.00000	.30215E-12	0.00000	.87486E-01	0.00000	.20738E+00	0.00000	-.91025E-13	0.00000	.25828E-13	0.00000
-.47007E-13	0.00000	.33859E-12	0.00000	-.87486E-01	0.00000	-.20738E+00	0.00000	-.61229E-13	0.00000	.14123E-12	0.00000
.30073E-13	0.00000	.24867E-12	0.00000	.68664E-01	0.00000	-.28929E+00	0.00000	-.58315E-13	0.00000	.12217E-12	0.00000
-.20639E-13	0.00000	-.29479E-12	0.00000	-.68664E-01	0.00000	.28929E+00	0.00000	-.31492E-14	0.00000	-.10943E-12	0.00000
-.43438E-13	0.00000	-.57206E-12	0.00000	-.18133E+00	0.00000	.87407E-01	0.00000	.14284E-12	0.00000	.60270E-13	0.00000
.28085E-13	0.00000	-.82554E-13	0.00000	.18133E+00	0.00000	-.87407E-01	0.00000	.10704E-12	0.00000	.10130E-12	0.00000
.40111E-13	0.00000	.21551E-12	0.00000	.15163E+00	0.00000	.22278E-12	0.00000	-.81130E-13	0.00000	-.21549E-13	0.00000
.11901E-13	0.00000	.19267E-12	0.00000	-.15163E+00	0.00000						
.51432E-13	0.00000	.21815E-12	0.00000	.15163E+00	0.00000						
-.49207E-13	0.00000	.18527E-12	0.00000	-.15163E+00	0.00000	-.18462E-12	0.00000	-.57796E-13	0.00000	.38359E-13	0.00000
-.84151E-13	0.00000	-.17640E-12	0.00000	-.18133E+00	0.00000	-.87407E-01	0.00000	.19685E-12	0.00000	.70964E-13	0.00000
.12307E-12	0.00000	-.58992E-12	0.00000	.18133E+00	0.00000	.87407E-01	0.00000	.16564E-12	0.00000	-.80088E-13	0.00000
.13225E-13	0.00000	-.23821E-12	0.00000	.68664E-01	0.00000	.28929E+00	0.00000	.24370E-13	0.00000	-.23204E-12	0.00000
.20544E-13	0.00000	.27129E-12	0.00000	-.68664E-01	0.00000	-.28929E+00	0.00000	-.34829E-14	0.00000	.19856E-12	0.00000
.50979E-13	0.00000	.42613E-12	0.00000	.87486E-01	0.00000	-.20738E+00	0.00000	-.10338E-12	0.00000	-.15842E-13	0.00000
-.25456E-13	0.00000	.34099E-12	0.00000	-.87486E-01	0.00000	.20738E+00	0.00000	-.10680E-12	0.00000	-.24121E-12	0.00000
-.95294E-13	0.00000	-.30950E-13	0.00000	-.12644E+00	0.00000	.19822E+00	0.00000	.50965E-13	0.00000	-.78816E-13	0.00000
-.28358E-13	0.00000	-.39047E-12	0.00000	.12644E+00	0.00000	-.19822E+00	0.00000	.52137E-13	0.00000	.44675E-14	0.00000

NATURAL FREQUENCY= .141374E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.87931E-01	0.00000	.41982E-13	0.00000	.16790E-13	0.00000	.65093E-13	0.00000	.14421E+00	0.00000	.13396E+00	0.00000
.87931E-01	0.00000	.13003E-13	0.00000	-.32495E-14	0.00000	.17261E-12	0.00000	.14421E+00	0.00000	-.13396E+00	0.00000
.80915E-01	0.00000	.69726E-13	0.00000	-.10704E-12	0.00000	-.60007E-13	0.00000	-.15696E+00	0.00000	-.15625E+00	0.00000
.80915E-01	0.00000	-.70970E-13	0.00000	-.51127E-13	0.00000	-.93580E-13	0.00000	-.15696E+00	0.00000	.15625E+00	0.00000
.30891E-01	0.00000	-.69633E-13	0.00000	.65003E-13	0.00000	.95319E-13	0.00000	-.86590E-01	0.00000	.26647E+00	0.00000
.30891E-01	0.00000	.32796E-13	0.00000	.60681E-13	0.00000	.11529E-12	0.00000	-.86590E-01	0.00000	-.26647E+00	0.00000
.11747E+00	0.00000	.21459E-13	0.00000	-.62608E-13	0.00000	-.12348E-14	0.00000	.22942E+00	0.00000	-.37544E-01	0.00000
.11747E+00	0.00000	-.36814E-14	0.00000	.13075E-13	0.00000	-.28859E-13	0.00000	.22942E+00	0.00000	.37544E-01	0.00000
.61456E-01	0.00000	.75384E-13	0.00000	.11141E-13	0.00000	.24205E-13	0.00000	-.37343E-12	0.00000	.61456E-01	0.00000
.61456E-01	0.00000	-.61858E-13	0.00000	-.31956E-13	0.00000						
.61456E-01	0.00000	.81443E-13	0.00000	.54778E-13	0.00000						
.61456E-01	0.00000	-.56596E-13	0.00000	.54860E-13	0.00000	.44132E-13	0.00000	-.39035E-12	0.00000	-.61456E-01	0.00000
.11747E+00	0.00000	-.13558E-12	0.00000	-.98672E-14	0.00000	.12810E-12	0.00000	-.22942E+00	0.00000	-.37544E-01	0.00000
.11747E+00	0.00000	.12662E-13	0.00000	-.99093E-14	0.00000	.13843E-12	0.00000	-.22942E+00	0.00000	.37544E-01	0.00000
-.30891E-01	0.00000	.60609E-14	0.00000	-.32501E-13	0.00000	.23462E-13	0.00000	.86590E-01	0.00000	.26647E+00	0.00000
.30891E-01	0.00000	.11721E-13	0.00000	-.30931E-13	0.00000	.99818E-14	0.00000	.86590E-01	0.00000	-.26647E+00	0.00000
-.80915E-01	0.00000	.12290E-12	0.00000	-.80715E-14	0.00000	-.66747E-13	0.00000	.15696E+00	0.00000	-.15625E+00	0.00000
.80915E-01	0.00000	.20465E-13	0.00000	.86807E-15	0.00000	-.35730E-13	0.00000	.15696E+00	0.00000	.15625E+00	0.00000
.87931E-01	0.00000	-.14072E-13	0.00000	.86667E-14	0.00000	.42798E-13	0.00000	-.14421E+00	0.00000	.13396E+00	0.00000
-.87931E-01	0.00000	-.55125E-13	0.00000	.11485E-14	0.00000	.41001E-13	0.00000	-.14421E+00	0.00000	-.13396E+00	0.00000

NATURAL FREQUENCY= .149273E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.21367E-13	0.00000	.10684E+00	0.00000	.10204E-01	0.00000	.17563E+00	0.00000	-.32582E-13	0.00000	-.33804E-13	0.00000
-.14391E-13	0.00000	-.10684E+00	0.00000	.10204E-01	0.00000	.17563E+00	0.00000	-.73990E-13	0.00000	.23227E-13	0.00000
-.31258E-13	0.00000	.20090E-01	0.00000	.21855E-01	0.00000	-.84948E-01	0.00000	.75702E-13	0.00000	.78223E-13	0.00000
.15778E-13	0.00000	-.20090E-01	0.00000	.21855E-01	0.00000	-.84948E-01	0.00000	.44090E-14	0.00000	-.65782E-13	0.00000
-.32040E-13	0.00000	-.16074E+00	0.00000	-.26186E-01	0.00000	.28520E+00	0.00000	.28751E-13	0.00000	-.78707E-13	0.00000
.12091E-13	0.00000	.16094E+00	0.00000	-.26186E-01	0.00000	.28520E+00	0.00000	.37178E-13	0.00000	.97055E-13	0.00000
-.76223E-15	0.00000	.15205E+00	0.00000	-.53351E-01	0.00000	-.26688E+00	0.00000	-.78099E-13	0.00000	.20189E-13	0.00000
-.43098E-13	0.00000	-.15205E+00	0.00000	-.53351E-01	0.00000	-.26688E+00	0.00000	-.48391E-13	0.00000	-.18274E-13	0.00000
-.93925E-14	0.00000	.33250E-13	0.00000	.47478E-01	0.00000	.61297E-13	0.00000	-.39841E-14	0.00000	.19069E-13	0.00000
.22732E-13	0.00000	-.21014E-12	0.00000	.47478E-01	0.00000						
-.26420E-13	0.00000	.27129E-13	0.00000	.47478E-01	0.00000						
-.17531E-13	0.00000	-.22373E-12	0.00000	.47478E-01	0.00000	.41899E-13	0.00000	-.20999E-13	0.00000	.12957E-13	0.00000
.28703E-13	0.00000	-.15205E+00	0.00000	-.53351E-01	0.00000	.26688E+00	0.00000	-.64000E-14	0.00000	.72173E-13	0.00000
.21893E-13	0.00000	.15205E+00	0.00000	-.53351E-01	0.00000	.26688E+00	0.00000	-.13111E-13	0.00000	.80510E-13	0.00000
.74741E-13	0.00000	.16094E+00	0.00000	-.26186E-01	0.00000	-.28520E+00	0.00000	-.79783E-13	0.00000	-.13390E-12	0.00000
-.58419E-14	0.00000	-.16094E+00	0.00000	-.26186E-01	0.00000	-.28520E+00	0.00000	-.86113E-13	0.00000	-.14296E-12	0.00000
-.43386E-13	0.00000	-.20090E-01	0.00000	.21855E-01	0.00000	.84948E-01	0.00000	.25362E-14	0.00000	-.27443E-13	0.00000
-.43006E-13	0.00000	.20090E-01	0.00000	.21855E-01	0.00000	.84948E-01	0.00000	.43754E-14	0.00000	-.52884E-13	0.00000
.16381E-13	0.00000	-.10684E+00	0.00000	.10204E-01	0.00000	-.17563E+00	0.00000	-.11101E-13	0.00000	.47572E-14	0.00000
.17621E-13	0.00000	.10684E+00	0.00000	.10204E-01	0.00000	-.17563E+00	0.00000	-.37681E-14	0.00000	.40026E-13	0.00000

NATURAL FREQUENCY= .150?75E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.23127E-14	0.00000	.18587E+00	0.00000	.12436E-11	0.00000	.16884E-11	0.00000	-.10658E-13	0.00000	-.19581E-16	0.00000
.10985E-13	0.00000	.18587E+00	0.00000	-.12977E-11	0.00000	-.20049E-11	0.00000	.16884E-13	0.00000	-.51473E-14	0.00000
-.67445E-14	0.00000	-.30075E+00	0.00000	-.11977E-11	0.00000	-.17250E-11	0.00000	-.68697E-13	0.00000	-.28232E-13	0.00000
-.52666E-13	0.00000	-.30075E+00	0.00000	.11731E-11	0.00000	.17652E-11	0.00000	-.69798E-13	0.00000	-.43649E-14	0.00000
-.37751E-16	0.00000	.31621E-13	0.00000	.24351E-13	0.00000	.28370E-11	0.00000	.36292E-13	0.00000	.15315E-12	0.00000
.10363E-13	0.00000	-.28321E-12	0.00000	.21800E-14	0.00000	-.33635E-11	0.00000	.37370E-13	0.00000	.74665E-13	0.00000
.25265E-13	0.00000	.30075E+00	0.00000	.10499E-11	0.00000	-.17303E-11	0.00000	.13320E-13	0.00000	-.17119E-12	0.00000
.17166E-13	0.00000	.30075E+00	0.00000	-.93658E-12	0.00000	.23382E-11	0.00000	-.39829E-13	0.00000	.39531E-13	0.00000
.70134E-14	0.00000	-.18587E+00	0.00000	-.15351E-11	0.00000	.17142E-11	0.00000	-.81135E-14	0.00000	-.24955E-13	0.00000
-.27341E-13	0.00000	-.18587E+00	0.00000	.14226E-11	0.00000						
-.34365E-13	0.00000	-.18587E+00	0.00000	.19516E-11	0.00000						
.12572E-13	0.00000	-.18587E+00	0.00000	-.19654E-11	0.00000	-.17146E-11	0.00000	-.22629E-13	0.00000	-.15151E-13	0.00000
.34289E-13	0.00000	.30075E+00	0.00000	-.15401E-11	0.00000	-.24449E-11	0.00000	-.35636E-13	0.00000	-.59220E-13	0.00000
.60311E-14	0.00000	.30075E+00	0.00000	.16255E-11	0.00000	.21690E-11	0.00000	-.26156E-13	0.00000	-.62950E-13	0.00000
-.42245E-13	0.00000	-.46078E-13	0.00000	.23631E-12	0.00000	.42934F-11	0.00000	.19788E-13	0.00000	.46639E-13	0.00000
-.26180E-14	0.00000	.18587E-12	0.00000	-.21893E-12	0.00000	-.39295E-11	0.00000	.39605E-13	0.00000	-.15223E-12	0.00000
-.56531E-13	0.00000	-.30075E+00	0.00000	.14682E-11	0.00000	-.26103E-11	0.00000	.98707E-14	0.00000	.74689E-13	0.00000
-.11948E-13	0.00000	-.30075E+00	0.00000	-.15039E-11	0.00000	.23787E-11	0.00000	.32133E-13	0.00000	.15774E-12	0.00000
.82713E-13	0.00000	.18587E+00	0.00000	-.16669E-11	0.00000	.25769E-11	0.00000	-.28752E-13	0.00000	.11607E-12	0.00000
.40820E-13	0.00000	.18587E+00	0.00000	.16820E-11	0.00000	-.24337E-11	0.00000	-.82308E-14	0.00000	-.44121E-13	0.00000

NATURAL FREQUENCY= .151565E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.19464E-13	0.00000	.22990E-11	0.00000	-.12235E+00	0.00000	-.18143E+00	0.00000	-.23910E-13	0.00000	-.34605E-13	0.00000
-.21921E-13	0.00000	.23276E-11	0.00000	.12235E+00	0.00000	.18143E+00	0.00000	-.28480E-13	0.00000	.56346E-13	0.00000
.15034E-13	0.00000	-.37247E-11	0.00000	.11138E+00	0.00000	.17875E+00	0.00000	-.26488E-13	0.00000	-.27240E-13	0.00000
.89351E-14	0.00000	-.37339E-11	0.00000	-.11138E+00	0.00000	-.17875E+00	0.00000	-.97525E-14	0.00000	.18986E-13	0.00000
-.34661E-13	0.00000	.30593E-13	0.00000	.90891E-02	0.00000	-.30223E+00	0.00000	.46857E-13	0.00000	-.31132E-13	0.00000
.23936E-13	0.00000	-.27605E-13	0.00000	-.90891E-02	0.00000	.30223E+00	0.00000	.46672E-13	0.00000	.59309E-13	0.00000
.34602E-13	0.00000	.37502E-11	0.00000	-.10689E+00	0.00000	.18262E+00	0.00000	.42141E-13	0.00000	-.48808E-13	0.00000
-.12709E-13	0.00000	.37341E-11	0.00000	.10689E+00	0.00000	-.18262E+00	0.00000	-.30463E-13	0.00000	.14127E-12	0.00000
-.43792E-15	0.00000	-.23752E-11	0.00000	.14295E+00	0.00000	-.14295E+00	0.00000	.51509E-14	0.00000	-.16841E-13	0.00000
.38046E-13	0.00000	-.22988E-11	0.00000	-.14295E+00	0.00000						
.54973E-13	0.00000	-.23246E-11	0.00000	-.14295E+00	0.00000						
-.11380E-13	0.00000	-.23165E-11	0.00000	.14295E+00	0.00000	.14295E+00	0.00000	-.49603E-13	0.00000	.26517E-13	0.00000
-.59941E-13	0.00000	.37931E-11	0.00000	.10689E+00	0.00000	.18262E+00	0.00000	.77915E-13	0.00000	-.92439E-13	0.00000
.84293E-14	0.00000	.38226E-11	0.00000	-.10689E+00	0.00000	-.18262E+00	0.00000	.71027E-13	0.00000	-.10873E-12	0.00000
-.32823E-13	0.00000	-.30517E-13	0.00000	-.90891E-02	0.00000	-.30223E+00	0.00000	-.28614E-13	0.00000	.85545E-13	0.00000
-.54899E-13	0.00000	-.21525E-14	0.00000	.90891E-02	0.00000	.30223E+00	0.00000	-.43185E-13	0.00000	.23059E-12	0.00000
.62209E-13	0.00000	-.37476E-11	0.00000	-.11138E+00	0.00000	.17875E+00	0.00000	-.24245E-14	0.00000	.85313E-13	0.00000
.59348E-13	0.00000	-.37792E-11	0.00000	.11138E+00	0.00000	-.17875E+00	0.00000	.36897E-13	0.00000	.17983E-13	0.00000
-.14664E-13	0.00000	.22765E-11	0.00000	.12235E+00	0.00000	-.18143E+00	0.00000	-.26556E-13	0.00000	-.50507E-13	0.00000
-.32777E-13	0.00000	.24054E-11	0.00000	-.12235E+00	0.00000	.18143E+00	0.00000	.15711E-13	0.00000	-.77763E-14	0.00000

NATURAL FREQUENCY= .156512E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.14383E-12	0.00000	-.73165E-01	0.00000	-.93298E-02	0.00000	-.82356E-01	0.00000	-.17199E-12	0.00000	-.13961E-12	0.00000
-.16805E-12	0.00000	.73165E-01	0.00000	-.93298E-02	0.00000	-.82356E-01	0.00000	-.21072E-12	0.00000	.16694E-12	0.00000
-.13428E-12	0.00000	.29904E-01	0.00000	-.18286E-01	0.00000	-.60357E-02	0.00000	.20860E-12	0.00000	-.15635E-12	0.00000
.13880E-12	0.00000	-.29904E-01	0.00000	-.18286E-01	0.00000	-.60357E-02	0.00000	.22453E-12	0.00000	.18571E-12	0.00000
.28769E-13	0.00000	.64611E-01	0.00000	.50528E-01	0.00000	-.16028E+00	0.00000	-.13611E-12	0.00000	-.26809E-12	0.00000
-.28494E-13	0.00000	-.64611E-01	0.00000	.50528E-01	0.00000	-.16028E+00	0.00000	-.14457E-12	0.00000	.19430E-12	0.00000
-.19012E-12	0.00000	-.14570E+00	0.00000	.53175E-01	0.00000	.35800E+00	0.00000	.20052E-12	0.00000	.15362E-12	0.00000
.17038E-12	0.00000	.14570E+00	0.00000	.53175E-01	0.00000	.35800E+00	0.00000	.25816E-12	0.00000	-.10990E-12	0.00000
.10337E-12	0.00000	.19424E+00	0.00000	-.11832E+00	0.00000	.11832E+00	0.00000	-.14762E-12	0.00000	-.38248E-13	0.00003
-.10442E-12	0.00000	-.19424E+00	0.00000	-.11832E+00	0.00000						
.15428E-12	0.00000	.19424E+00	0.00000	.11832E+00	0.00000						
-.13268E-12	0.00000	-.19424E+00	0.00000	.11832E+00	0.00000	.11832E+00	0.00000	-.16659E-12	0.00000	.46027E-13	0.00000
-.20219E-12	0.00000	-.14570E+00	0.00000	-.53175E-01	0.00000	.35800E+00	0.00000	.24729E-12	0.00000	-.27063E-12	0.00000
.18618E-12	0.00000	.14570E+00	0.00000	-.53175E-01	0.00000	.35800E+00	0.00000	.28034E-12	0.00000	.35965E-12	0.00000
.69721E-13	0.00000	.64611E-01	0.00000	-.50528E-01	0.00000	-.16028E+00	0.00000	-.18300E-12	0.00000	.36373E-13	0.00000
.31888E-14	0.00000	-.64611E-01	0.00000	-.50528E-01	0.00000	-.16028E+00	0.00000	-.18488E-12	0.00000	-.63925E-13	0.00000
-.18461E-12	0.00000	.29904E-01	0.00000	.18286E-01	0.00000	-.60357E-02	0.00000	.22617E-12	0.00000	.97960E-13	0.00000
.15904E-12	0.00000	-.29904E-01	0.00000	.18286E-01	0.00000	-.60357E-02	0.00000	.22123E-12	0.00000	-.19763E-12	0.00000
.11416E-12	0.00000	-.73165E-01	0.00000	.93298E-02	0.00000	-.82356E-01	0.00000	-.13027E-12	0.00000	.13002E-12	0.00000
-.10958E-12	0.00000	.73165E-01	0.00000	.93298E-02	0.00000	-.82356E-01	0.00000	-.13491E-12	0.00000	-.11722E-12	0.00000

NATURAL FREQUENCY= .154656E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.19586E-01	0.00000	-.88422E-15	0.00000	-.86511E-14	0.00000	-.55581E-13	0.00000	-.75551E-02	0.00000	-.25799E-01	0.00000
.19586E-01	0.00000	.93836E-13	0.00000	-.24807E-13	0.00000	-.90086E-13	0.00000	-.75551E-02	0.00000	.25799E-01	0.00000
-.73963E-01	0.00000	.32938E-13	0.00000	-.68344E-14	0.00000	.17442E-13	0.00000	.89980E-01	0.00000	.21894E+00	0.00000
.73963E-01	0.00000	-.44037E-13	0.00000	.52146E-13	0.00000	-.40180E-13	0.00000	.89980E-01	0.00000	-.21894E+00	0.00000
.19023E-01	0.00000	.82745E-14	0.00000	-.85110E-14	0.00000	.19915E-13	0.00000	-.65156E-01	0.00000	.11383E+00	0.00000
-.19023E-01	0.00000	-.36930E-13	0.00000	-.10164E-14	0.00000	.92951E-13	0.00000	-.65156E-01	0.00000	-.11383E+00	0.00000
-.48991E-01	0.00000	.92284E-13	0.00000	-.35342E-13	0.00000	-.11856E-12	0.00000	.64845E-01	0.00000	.39015E+00	0.00000
.48991E-01	0.00000	.40739E-13	0.00000	.12174E-13	0.00000	.18472E-12	0.00000	.64845E-01	0.00000	-.39015E+00	0.00000
.88217E-01	0.00000	-.13007E-13	0.00000	.57213E-13	0.00000	-.26378E-13	0.00000	-.39986E-12	0.00000	.88217E-01	0.00000
-.88217E-01	0.00000	-.47647E-13	0.00000	-.79669E-13	0.00000						
-.88217E-01	0.00000	-.13513E-13	0.00000	.19920E-14	0.00000						
.88217E-01	0.00000	-.43772E-13	0.00000	-.93930E-14	0.00000	.35736E-13	0.00000	-.39565E-12	0.00000	-.88217E-01	0.00000
.48991E-01	0.00000	.16543E-13	0.00000	.17109E-13	0.00000	.45598E-13	0.00000	-.64845E-01	0.00000	.39015E+00	0.00000
-.48991E-01	0.00000	-.10971E-13	0.00000	-.31828E-13	0.00000	.16611E-13	0.00000	-.64845E-01	0.00000	-.39015E+00	0.00000
-.19023E-01	0.00000	.15011E-13	0.00000	.24060E-13	0.00000	.41995E-13	0.00000	.65156E-01	0.00000	.11383E+00	0.00000
.19023E-01	0.00000	.18367E-13	0.00000	-.23636E-13	0.00000	-.91492E-13	0.00000	.65156E-01	0.00000	-.11383E+00	0.00000
.73963E-01	0.00000	-.25850E-13	0.00000	-.24482E-13	0.00000	.56561E-13	0.00000	-.89980E-01	0.00000	.21894E+00	0.00000
-.73963E-01	0.00000	-.87385E-13	0.00000	.52296E-13	0.00000	-.63839E-13	0.00000	-.89980E-01	0.00000	-.21894E+00	0.00000
.19586E-01	0.00000	.11682E-13	0.00000	.34494E-14	0.00000	-.32097E-13	0.00000	.75551E-02	0.00000	-.25799E-01	0.00000
-.19586E-01	0.00000	.20689E-13	0.00000	.13884E-13	0.00000	-.13299E-13	0.00000	.75551E-02	0.00000	.25799E-01	0.00000

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.49578E-01	0.00000	-.11123E-13	0.00000	-.37388E-13	0.00000	-.61393E-13	0.00000	-.22209E-01	0.00000	.14991E-02	0.00000
.49578E-01	0.00000	-.31807E-13	0.00000	-.49093E-13	0.00000	-.18997E-14	0.00000	-.22209E-01	0.00000	-.14991E-02	0.00000
.50537E-01	0.00000	.42127E-13	0.00000	-.64679E-15	0.00000	.22007E-13	0.00000	-.50750E-01	0.00000	-.27504E+00	0.00000
.50537E-01	0.00000	.39937E-13	0.00000	.16338E-13	0.00000	-.18604E-12	0.00000	-.50750E-01	0.00000	.27504E+00	0.00000
.14062E-01	0.00000	.35424E-13	0.00000	.46893E-13	0.00000	.17450E-13	0.00000	.41153E-01	0.00000	-.15457E+00	0.00000
.14062E-01	0.00000	.24899E-13	0.00000	-.58183E-14	0.00000	.19033E-13	0.00000	.41153E-01	0.00000	.15457E+00	0.00000
.10031E-01	0.00000	-.42517E-13	0.00000	.10696E-13	0.00000	.35228E-13	0.00000	-.44251E-01	0.00000	-.35612E+00	0.00000
.10031E-01	0.00000	-.82163E-13	0.00000	-.26229E-14	0.00000	-.44675E-13	0.00000	-.44251E-01	0.00000	.35612E+00	0.00000
.96084E-01	0.00000	.15918E-13	0.00000	-.78884E-14	0.00000	.27705E-13	0.00000	.76057E-01	0.00000	.11072E-11	0.00000
.96084E-01	0.00000	.36035E-13	0.00000	.87756E-14	0.00000						
.96084E-01	0.00000	.18317E-13	0.00000	.54457E-13	0.00000						
.96084E-01	0.00000	.35371E-13	0.00000	-.50262E-13	0.00000	-.30012E-13	0.00000	.76057E-01	0.00000	-.11205E-11	0.00000
.10031E-01	0.00000	-.38176E-13	0.00000	-.47940E-13	0.00000	.70161E-13	0.00000	-.44251E-01	0.00000	.35612E+00	0.00000
.10031E-01	0.00000	-.46890E-13	0.00000	.44408E-13	0.00000	-.84882E-13	0.00000	-.44251E-01	0.00000	-.35612E+00	0.00000
.14062E-01	0.00000	-.24424E-15	0.00000	.93417E-14	0.00000	-.76763E-14	0.00000	.41153E-01	0.00000	.15457E+00	0.00000
.14062E-01	0.00000	.50580E-13	0.00000	-.13852E-13	0.00000	-.26797E-13	0.00000	.41153E-01	0.00000	-.15457E+00	0.00000
.50537E-01	0.00000	-.20511E-13	0.00000	-.60217E-13	0.00000	-.17359E-13	0.00000	-.50750E-01	0.00000	.27504E+00	0.00000
.50537E-01	0.00000	.16015E-13	0.00000	.32355E-13	0.00000	.27371E-13	0.00000	-.50750E-01	0.00000	-.27504E+00	0.00000
.49578E-01	0.00000	-.24655E-13	0.00000	.35225E-13	0.00000	-.59418E-14	0.00000	-.22209E-01	0.00000	-.14991E-02	0.00000
.49578E-01	0.00000	.19416E-13	0.00000	-.33740E-13	0.00000	.62465E-13	0.00000	-.22209E-01	0.00000	.14991E-02	0.00000

NATURAL FREQUENCY= .156288E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.12993E+00	0.00000	-.38830E-13	0.00000	.16252E-14	0.00000	-.10983E-13	0.00000	-.12320E+00	0.00000	-.97208E-01	0.00000
-.12993E+00	0.00000	.79774E-13	0.00000	-.60284E-15	0.00000	-.24711E-13	0.00000	-.12320E+00	0.00000	.97208E-01	0.00000
-.95945E-01	0.00000	-.14063E-15	0.00000	.90100E-14	0.00000	-.12199E-12	0.00000	.15940E+00	0.00000	-.27375E+00	0.00000
.95945E-01	0.00000	-.64003E-13	0.00000	.10523E-13	0.00000	.12424E-13	0.00000	.15940E+00	0.00000	.27375E+00	0.00000
.48150E-01	0.00000	.77738E-14	0.00000	.34906E-13	0.00000	.82912E-13	0.00000	-.13712E+00	0.00000	-.16332E+00	0.00000
-.48150E-01	0.00000	.84333E-14	0.00000	.34489E-13	0.00000	-.93712E-13	0.00000	-.13712E+00	0.00000	.16332E+00	0.00000
-.14554E+00	0.00000	-.38806E-14	0.00000	-.22389E-13	0.00000	.12820E-12	0.00000	.16629E+00	0.00000	.25801E-01	0.00000
.14554E+00	0.00000	.35403E-13	0.00000	.17936E-13	0.00000	.66433E-13	0.00000	.16629E+00	0.00000	-.25801E-01	0.00000
.54700E-01	0.00000	.30757E-13	0.00000	-.48143E-13	0.00000	.60681E-13	0.00000	-.33520E-11	0.00000	.54700E-01	0.00000
-.54700E-01	0.00000	-.37890E-13	0.00000	-.15450E-13	0.00000						
-.54700E-01	0.00000	.31235E-13	0.00000	.80743E-13	0.00000						
.54700E-01	0.00000	-.38179E-13	0.00000	-.32314E-13	0.00000	-.39515E-14	0.00000	-.33512E-11	0.00000	-.54700E-01	0.00000
.14554E+00	0.00000	-.29213E-13	0.00000	-.68781E-13	0.00000	.14135E-12	0.00000	-.16629E+00	0.00000	.25801E-01	0.00000
-.14554E+00	0.00000	.81643E-13	0.00000	.40195E-13	0.00000	-.28677E-14	0.00000	-.16629E+00	0.00000	-.25801E-01	0.00000
-.48150E-01	0.00000	-.20060E-13	0.00000	-.10220E-13	0.00000	-.39819E-13	0.00000	.13712E+00	0.00000	-.16332E+00	0.00000
.48150E-01	0.00000	-.28600E-13	0.00000	-.14863E-13	0.00000	-.31993E-13	0.00000	.13712E+00	0.00000	.16332E+00	0.00000
.95945E-01	0.00000	-.16867E-13	0.00000	-.58703E-13	0.00000	-.84912E-13	0.00000	-.15940E+00	0.00000	-.27375E+00	0.00000
-.95945E-01	0.00000	.26392E-13	0.00000	.66173E-13	0.00000	.58423E-13	0.00000	-.15940E+00	0.00000	.27375E+00	0.00000
-.12993E+00	0.00000	-.47412E-13	0.00000	.63677E-13	0.00000	-.59585E-13	0.00000	.12320E+00	0.00000	-.97208E-01	0.00000
.12993E+00	0.00000	.91921E-14	0.00000	-.59093E-13	0.00000	.35860E-13	0.00000	.12320E+00	0.00000	.97208E-01	0.00000

NATURAL FREQUENCY= .156471E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.11990E+00	0.00000	-.21817E-13	0.00000	-.31009E-13	0.00000	-.13783E-13	0.00000	.11840E+00	0.00000	.96990E-01	0.00000
.11990E+00	0.00000	-.21451E-13	0.00000	.65740E-13	0.00000	.39181E-13	0.00000	.11840E+00	0.00000	-.96990E-01	0.00000
.10630E+00	0.00000	.39433E-13	0.00000	.87811E-14	0.00000	-.12385E-12	0.00000	-.17021E+00	0.00000	.22051E+00	0.00000
-.10630E+00	0.00000	-.10822E-14	0.00000	.39914E-15	0.00000	-.32237E-13	0.00000	-.17021E+00	0.00000	-.22051E+00	0.00000
-.50967E-01	0.00000	-.25915E-13	0.00000	-.93112E-14	0.00000	.25814E-13	0.00000	.15154E+00	0.00000	.12892E+00	0.00000
.50967E-01	0.00000	.20936E-13	0.00000	.46743E-14	0.00000	-.74401E-13	0.00000	.15154E+00	0.00000	-.12892E+00	0.00000
.14645E+00	0.00000	-.35387E-13	0.00000	-.29201E-13	0.00000	-.38118E-13	0.00000	-.19933E+00	0.00000	-.10549E+00	0.00000
-.14645E+00	0.00000	-.31730E-13	0.00000	-.18744E-14	0.00000	-.94372E-13	0.00000	-.19933E+00	0.00000	.10549E+00	0.00000
-.81882E-01	0.00000	.47612E-14	0.00000	.68200E-14	0.00000	-.11756E-13	0.00000	.99601E-01	0.00000	.18572E-11	0.00000
.81882E-01	0.00000	.17224E-13	0.00000	.26754E-13	0.00000						
-.81882E-01	0.00000	.32224E-14	0.00000	-.56044E-14	0.00000						
.81882E-01	0.00000	.18719E-13	0.00000	-.11296E-14	0.00000	-.16546E-13	0.00000	.99601E-01	0.00000	-.18309E-11	0.00000
.14645E+00	0.00000	-.14124E-13	0.00000	-.41252E-13	0.00000	-.18713E-13	0.00000	-.19933E+00	0.00000	.10549E+00	0.00000
-.14645E+00	0.00000	-.22419E-13	0.00000	.16116E-13	0.00000	.30938E-13	0.00000	-.19933E+00	0.00000	-.10549E+00	0.00000
-.50967E-01	0.00000	.20509E-13	0.00000	-.11490E-13	0.00000	-.27055E-13	0.00000	.15154E+00	0.00000	-.12892E+00	0.00000
.50967E-01	0.00000	-.57551E-14	0.00000	.21704E-13	0.00000	.15070E-12	0.00000	.15154E+00	0.00000	.12892E+00	0.00000
.10630E+00	0.00000	-.15194E-14	0.00000	.51812E-13	0.00000	.32700E-13	0.00000	-.17021E+00	0.00000	-.22051E+00	0.00000
-.10630E+00	0.00000	.25130E-13	0.00000	-.85990E-14	0.00000	.16404E-12	0.00000	-.17021E+00	0.00000	.22051E+00	0.00000
-.11990E+00	0.00000	.33738E-13	0.00000	.11641E-14	0.00000	.59771E-13	0.00000	.11840E+00	0.00000	-.96990E-01	0.00000
.11990E+00	0.00000	-.28656E-13	0.00000	-.29990E-13	0.00000	.44191E-13	0.00000	.11840E+00	0.00000	.96990E-01	0.00000

NATURAL FREQUENCY= .160140E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.41873E-13	0.00000	-.19592E+00	0.00000	-.84425E-01	0.00000	-.27528E+00	0.00000	-.34958E-13	0.00000	-.40839E-13	0.00000
.49977E-13	0.00000	.19592E+00	0.00000	-.84425E-01	0.00000	-.27528E+00	0.00000	-.52631E-13	0.00000	.71103E-13	0.00000
.79173E-13	0.00000	.69742E-01	0.00000	.58925E-01	0.00000	-.33388E+00	0.00000	.64269E-13	0.00000	-.78307E-13	0.00000
.90060E-13	0.00000	-.69742E-01	0.00000	.58925E-01	0.00000	-.33388E+00	0.00000	.64083E-13	0.00000	.67123E-13	0.00000
.39783E-13	0.00000	-.44597E-01	0.00000	.31688E-01	0.00000	.79350E-01	0.00000	.11133E-13	0.00000	-.14367E-13	0.00000
.24128E-13	0.00000	.44597E-01	0.00000	.31688E-01	0.00000	.79350E-01	0.00000	-.15632E-13	0.00000	-.44707E-13	0.00000
.36158E-13	0.00000	-.46052E-02	0.00000	-.20740E-01	0.00000	-.76626E-01	0.00000	.72951E-13	0.00000	.12551E-12	0.00000
.10395E-12	0.00000	.46052E-02	0.00000	-.20740E-01	0.00000	-.76626E-01	0.00000	.69009E-13	0.00000	-.21574E-12	0.00000
.68557E-13	0.00000	-.47360E-02	0.00000	.16173E-01	0.00000	-.16173E-01	0.00000	-.49314E-13	0.00000	-.13531E-15	0.00000
-.12060E-12	0.00000	.47360E-02	0.00000	.16173E-01	0.00000						
.27439E-13	0.00000	-.47360E-02	0.00000	-.16173E-01	0.00000						
-.62102E-13	0.00000	.47360E-02	0.00000	-.16173E-01	0.00000	-.16173E-01	0.00000	-.89735E-13	0.00000	-.54386E-13	0.0000
-.71591E-13	0.00000	-.46052E-02	0.00000	.20740E-01	0.00000	-.76626E-01	0.00000	.99904E-13	0.00000	-.22237E-13	0.0000
.75052E-13	0.00000	.46052E-02	0.00000	.20740E-01	0.00000	-.76626E-01	0.00000	.92220E-13	0.00000	.60423E-13	0.0000
.12806E-13	0.00000	-.44597E-01	0.00000	-.31688E-01	0.00000	.79350E-01	0.00000	-.59897E-13	0.00000	.12213E-12	0.0000
-.51277E-13	0.00000	.44597E-01	0.00000	-.31688E-01	0.00000	.79350E-01	0.00000	-.41795E-13	0.00000	-.25011E-13	0.0000
-.35537E-13	0.00000	.69742E-01	0.00000	-.58925E-01	0.00000	-.33388E+00	0.00000	.32070E-13	0.00000	.10017E-12	0.0000
.75879E-13	0.00000	-.69742E-01	0.00000	-.58925E-01	0.00000	-.33388E+00	0.00000	.43446E-13	0.00000	-.37025E-14	0.0000
.51234E-13	0.00000	-.19592E+00	0.00000	.84425E-01	0.00000	-.27528E+00	0.00000	-.17329E-13	0.00000	.34830E-13	0.0000
-.49352E-13	0.00000	.19592E+00	0.00000	.84425E-01	0.00000	-.27528E+00	0.00000	.24795E-14	0.00000	-.34869E-13	0.0000

NATURAL FREQUENCY= .160117E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.14252E-12	0.00000	.19826E+00	0.00000	.84884E-01	0.00000	.27817E+00	0.00000	.78938E-13	0.00000	.84991E-13	0.00000
.12596E-12	0.00000	-.19826E+00	0.00000	.84884E-01	0.00000	.27817E+00	0.00000	.11067E-12	0.00000	-.70274E-13	0.00000
.11017E-12	0.00000	-.70664E-01	0.00000	-.58911E-01	0.00000	.33442E+00	0.00000	-.73553E-13	0.00000	.19843E-12	0.00000
-.11626E-12	0.00000	.70664E-01	0.00000	-.58911E-01	0.00000	.33442E+00	0.00000	-.87722E-13	0.00000	-.28678E-12	0.00000
.21173E-13	0.00000	.42822E-01	0.00000	-.32511E-01	0.00000	-.76582E-01	0.00000	-.19022E-13	0.00000	.24308E-13	0.00000
-.26417E-13	0.00000	-.42822E-01	0.00000	-.32511E-01	0.00000	-.76582E-01	0.00000	-.20423E-13	0.00000	.73136E-13	0.00000
.61499E-13	0.00000	.78979E-02	0.00000	.17350E-01	0.00000	.68183E-01	0.00000	-.58614E-13	0.00000	-.28849E-12	0.00000
-.11449E-12	0.00000	-.78979E-02	0.00000	.17350E-01	0.00000	.68183E-01	0.00000	-.10625E-12	0.00000	.23879E-12	0.00000
-.86872E-13	0.00000	-.41633E-12	0.00000	-.10812E-01	0.00000	-.12680E-11	0.00000	.17915E-13	0.00000	-.24878E-13	0.00000
.12990E-12	0.00000	.44630E-12	0.00000	-.10812E-01	0.00000						
-.46916E-13	0.00000	-.45345E-12	0.00000	-.10812E-01	0.00000						
.47678E-13	0.00000	.42416E-12	0.00000	-.10812E-01	0.00000	-.13281E-11	0.00000	.52824E-13	0.00000	.62993E-13	0.00000
.48444E-13	0.00000	-.78979E-02	0.00000	.17350E-01	0.00000	-.68183E-01	0.00000	-.89997E-13	0.00000	.15784E-13	0.00000
-.49365E-13	0.00000	.78979E-02	0.00000	.17350E-01	0.00000	-.68183E-01	0.00000	-.74656E-13	0.00000	.13698E-13	0.00000
-.44680E-13	0.00000	-.42822E-01	0.00000	-.32511E-01	0.00000	.76582E-01	0.00000	.78456E-13	0.00000	-.91347E-13	0.00000
.57666E-13	0.00000	.42822E-01	0.00000	-.32511E-01	0.00000	.76582E-01	0.00000	.87619E-13	0.00000	.11346E-12	0.00000
.72785E-13	0.00000	.70664E-01	0.00000	-.58911E-01	0.00000	-.33442E+00	0.00000	-.10973E-12	0.00000	-.34073E-13	0.00000
-.20892E-13	0.00000	-.70664E-01	0.00000	-.58911E-01	0.00000	-.33442E+00	0.00000	-.98311E-13	0.00000	-.10456E-13	0.00000
-.75750E-13	0.00000	-.19826E+00	0.00000	.84884E-01	0.00000	-.27817E+00	0.00000	.47088E-13	0.00000	-.62298E-13	0.00000
.79597E-13	0.00000	.19826E+00	0.00000	.84884E-01	0.00000	-.27817E+00	0.00000	.50605E-13	0.00000	.19381E-13	0.00000

NATURAL FREQUENCY= .165625E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.47273E-13	0.00000	-.49682E-13	0.00000	.10640E+00	0.00000	.26016E-01	0.00000	.51340E-13	0.00000	.56496E-13	0.00000
.83342E-13	0.00000	.80711E-13	0.00000	-.10640E+00	0.00000	-.26016E-01	0.00000	.39702E-13	0.00000	-.42286E-13	0.00000
.64727E-13	0.00000	.84175E-14	0.00000	.43328E-01	0.00000	.28142E+00	0.00000	-.50656E-13	0.00000	-.61436E-13	0.00000
-.10727E-12	0.00000	-.71436E-13	0.00000	-.43328E-01	0.00000	-.28142E+00	0.00000	-.76761E-13	0.00000	.30985E-13	0.00000
-.12192E-12	0.00000	.40753E-13	0.00000	.13857E-01	0.00000	.21049E+00	0.00000	.66017E-13	0.00000	.53503E-13	0.00000
.11340E-12	0.00000	.45687E-13	0.00000	-.13857E-01	0.00000	-.21049E+00	0.00000	.75766E-13	0.00000	.14776E-13	0.00000
.24220E-13	0.00000	-.45234E-13	0.00000	-.29544E-01	0.00000	.31574E+00	0.00000	-.48963E-13	0.00000	.55620E-13	0.00000
-.27750E-13	0.00000	-.20639E-13	0.00000	.29544E-01	0.00000	-.31574E+00	0.00000	-.30976E-13	0.00000	-.93544E-13	0.00000
-.22321E-13	0.00000	-.18244E-13	0.00000	-.90278E-01	0.00000	.90278E-01	0.00000	.12865E-13	0.00000	-.10117E-13	0.00000
.14437E-13	0.00000	-.13964E-13	0.00000	.90278E-01	0.00000						
.43300E-14	0.00000	.64480E-14	0.00000	.90278E-01	0.00000						
-.47183E-13	0.00000	.11128E-13	0.00000	-.90278E-01	0.00000	-.90278E-01	0.00000	.15038E-13	0.00000	.21772E-13	0.00000
-.54031E-13	0.00000	.14325E-13	0.00000	.29544E-01	0.00000	.31574E+00	0.00000	.57287E-14	0.00000	-.62040E-13	0.00000
.58475E-13	0.00000	.67095E-13	0.00000	-.29544E-01	0.00000	-.31574E+00	0.00000	-.81340E-14	0.00000	.71800E-13	0.00000
.61673E-13	0.00000	-.67455E-13	0.00000	-.13857E-01	0.00000	.21049E+00	0.00000	-.72549E-13	0.00000	.20177E-13	0.00000
-.84565E-14	0.00000	-.17808E-13	0.00000	.13857E-01	0.00000	-.21049E+00	0.00000	-.67923E-13	0.00000	-.13112E-13	0.00000
.86665E-13	0.00000	.97777E-14	0.00000	-.43328E-01	0.00000	.28142E+00	0.00000	-.32994E-13	0.00000	-.18581E-12	0.00000
-.59806E-13	0.00000	.73173E-13	0.00000	.43328E-01	0.00000	-.28142E+00	0.00000	-.25911E-13	0.00000	.42559E-13	0.00000
-.11720E-12	0.00000	.37944E-13	0.00000	-.10640E+00	0.00000	.26016E-01	0.00000	.62308E-13	0.00000	-.63550E-13	0.00000
.10263E-12	0.00000	-.33305E-13	0.00000	.10640E+00	0.00000	-.26016E-01	0.00000	.76697E-13	0.00000	.36333E-13	0.00000

NATURAL FREQUENCY= .162483E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.84794E-01	0.00000	.85263E-13	0.00000	.17461E-12	0.00000	.22880E-12	0.00000	.74136E-01	0.00000	.85204E-01	0.00000
.84794E-01	0.00000	-.62183E-13	0.00000	-.14554E-12	0.00000	-.98156E-13	0.00000	.74136E-01	0.00000	-.85204E-01	0.00000
.15130E+00	0.00000	-.40272E-13	0.00000	-.18964E-12	0.00000	.85805E-13	0.00000	-.12654E+00	0.00000	.13892E+00	0.00000
-.15130E+00	0.00000	.49257E-14	0.00000	.15360E-12	0.00000	-.16583E-12	0.00000	-.12654E+00	0.00000	-.13892E+00	0.00000
.16589E-01	0.00000	-.93949E-13	0.00000	.93247E-13	0.00000	-.12458E-12	0.00000	-.40942E-02	0.00000	-.37663E+00	0.00000
-.16589E-01	0.00000	.33799E-13	0.00000	-.13106E-12	0.00000	-.19566E-12	0.00000	-.40942E-02	0.00000	.37663E+00	0.00000
-.12888E+00	0.00000	.29798E-13	0.00000	-.16749E-12	0.00000	-.76725E-13	0.00000	.94212E-01	0.00000	.38834E-01	0.00000
.12888E+00	0.00000	.52178E-13	0.00000	.20095E-12	0.00000	-.83488E-13	0.00000	.94212E-01	0.00000	-.38834E-01	0.00000
.42733E-01	0.00000	-.46075E-14	0.00000	.95993E-13	0.00000	-.52974E-13	0.00000	-.30146E-11	0.00000	.42733E-01	0.00000
-.42733E-01	0.00000	-.22353E-13	0.00000	-.95377E-13	0.00000						
-.42733E-01	0.00000	-.43910E-14	0.00000	-.16017E-13	0.00000						
.42733E-01	0.00000	-.20977E-13	0.00000	.20679E-14	0.00000	.47855E-13	0.00000	-.30162E-11	0.00000	-.42733E-01	0.00000
.12888E+00	0.00000	.40209E-13	0.00000	-.41797E-13	0.00000	-.34850E-14	0.00000	-.94212E-01	0.00000	.38834E-01	0.00000
-.12888E+00	0.00000	.34988E-13	0.00000	.13102E-15	0.00000	-.26917E-13	0.00000	-.94212E-01	0.00000	-.38834E-01	0.00000
-.16589E-01	0.00000	-.91804E-13	0.00000	-.39629E-13	0.00000	-.17364E-12	0.00000	.40942E-02	0.00000	-.37663E+00	0.00000
.16589E-01	0.00000	.69556E-15	0.00000	.32115E-13	0.00000	-.11183E-13	0.00000	.40942E-02	0.00000	.37663E+00	0.00000
-.15130E+00	0.00000	.22793E-13	0.00000	.34930E-13	0.00000	-.14198E-12	0.00000	.12654E+00	0.00000	.13892E+00	0.00000
.15130E+00	0.00000	.37211E-13	0.00000	.12719E-13	0.00000	.80867E-13	0.00000	.12654E+00	0.00000	-.13892E+00	0.00000
.84794E-01	0.00000	-.27157E-14	0.00000	.53109E-13	0.00000	-.71170E-15	0.00000	-.74136E-01	0.00000	.85204E-01	0.00000
-.84794E-01	0.00000	-.20000E-13	0.00000	-.27269E-13	0.00000	.27131E-13	0.00000	-.74136E-01	0.00000	-.85204E-01	0.00000

NATURAL FREQUENCY= .163603E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.24201E-01	0.00000	.46150E-14	0.00000	.73167E-13	0.00000	.93547E-13	0.00000	.56525E-02	0.00000	.20798E-01	0.00000
-.24201E-01	0.00000	-.16734E-13	0.00000	-.20304E-13	0.00000	.85962E-13	0.00000	.56525E-02	0.00000	-.20798E-01	0.00000
.80987E-01	0.00000	.33401E-13	0.00000	-.24686E-13	0.00000	.18948E-12	0.00000	-.10108E+00	0.00000	-.26563E+00	0.00000
-.80987E-01	0.00000	-.25338E-13	0.00000	.20313E-13	0.00000	-.13279E-13	0.00000	-.10108E+00	0.00000	.26563E+00	0.00000
-.19709E+00	0.00000	.21336E-13	0.00000	-.64075E-13	0.00000	-.29782E-13	0.00000	.18092E+00	0.00000	-.33622E-01	0.00000
.19709E+00	0.00000	.56804E-14	0.00000	.58785E-13	0.00000	.13843E-12	0.00000	.18092E+00	0.00000	.33622E-01	0.00000
.53147E-01	0.00000	.18477E-13	0.00000	.10364E-13	0.00000	-.60061E-13	0.00000	-.78565E-01	0.00000	.28360E+00	0.00000
-.53147E-01	0.00000	-.35309E-13	0.00000	-.23193E-13	0.00000	.16366E-12	0.00000	-.78565E-01	0.00000	-.28360E+00	0.00000
.38758E-01	0.00000	.45762E-15	0.00000	.40152E-13	0.00000	-.26644E-13	0.00000	-.69214E-02	0.00000	.56088E-12	0.00000
-.38758E-01	0.00000	.14496E-13	0.00000	-.42523E-13	0.00000						
.38758E-01	0.00000	.83763E-16	0.00000	-.15098E-13	0.00000						
-.38758E-01	0.00000	.14884E-13	0.00000	.62347E-14	0.00000	.24816E-13	0.00000	-.69214E-02	0.00000	-.59629E-12	0.00000
.53147E-01	0.00000	-.19910E-13	0.00000	-.58895E-13	0.00000	.56990E-13	0.00000	-.78565E-01	0.00000	-.28360E+00	0.00000
-.53147E-01	0.00000	-.37592E-13	0.00000	-.64154E-13	0.00000	-.79844E-13	0.00000	-.78565E-01	0.00000	.28360E+00	0.00000
-.19709E+00	0.00000	.23141E-13	0.00000	-.66545E-13	0.00000	-.43857E-13	0.00000	.18092E+00	0.00000	.33622E-01	0.00000
.19709E+00	0.00000	.45062E-13	0.00000	.62992E-13	0.00000	-.16807E-13	0.00000	.18092E+00	0.00000	-.33622E-01	0.00000
.80987E-01	0.00000	-.49209E-13	0.00000	.12200E-12	0.00000	.93063E-13	0.00000	-.10108E+00	0.00000	.26563E+00	0.00000
-.80987E-01	0.00000	-.20195E-13	0.00000	-.10904E-12	0.00000	-.14971E-12	0.00000	-.10108E+00	0.00000	-.26563E+00	0.00000
.24201E-01	0.00000	.24213E-13	0.00000	-.11643E-12	0.00000	.87710E-13	0.00000	.56525E-02	0.00000	-.20798E-01	0.00000
-.24201E-01	0.00000	-.67160E-16	0.00000	.10917E-12	0.00000	-.75165E-13	0.00000	.56525E-02	0.00000	.20798E-01	0.00000

NATURAL FREQUENCY= .163408E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.23957E-01	0.00000	-.10204E-12	0.00000	-.14352E-12	0.00000	-.18517E-12	0.00000	-.66426E-02	0.00000	-.22435E-01	0.00000
.23957E-01	0.00000	.66883E-13	0.00000	.99738E-13	0.00000	.67090E-14	0.00000	-.66426E-02	0.00000	.22435E-01	0.00000
.85015E-01	0.00000	.89799E-13	0.00000	.16965E-12	0.00000	-.28038E-12	0.00000	.10538E+00	0.00000	.27121E+00	0.00000
.85015E-01	0.00000	-.10425E-13	0.00000	-.12376E-12	0.00000	-.23822E-13	0.00000	.10538E+00	0.00000	-.27121E+00	0.00000
.19804E+00	0.00000	-.10460E-12	0.00000	-.10622E-12	0.00000	-.10781E-12	0.00000	-.18383E+00	0.00000	.41681E-01	0.00000
.19804E+00	0.00000	-.13932E-13	0.00000	.12249E-12	0.00000	.57716E-13	0.00000	-.18383E+00	0.00000	-.41681E-01	0.00000
.50922E-01	0.00000	.37706E-13	0.00000	.14929E-12	0.00000	-.14421E-12	0.00000	.79750E-01	0.00000	-.27101E+00	0.00000
.50922E-01	0.00000	.27730E-13	0.00000	-.14379E-12	0.00000	.50361E-13	0.00000	.79750E-01	0.00000	.27101E+00	0.00000
.23470E-01	0.00000	-.87432E-14	0.00000	-.22271E-13	0.00000	-.18731E-13	0.00000	-.36446E-12	0.00000	-.23470E-01	0.00000
.23470E-01	0.00000	-.18966E-14	0.00000	.33522E-13	0.00000						
.23470E-01	0.00000	-.83192E-14	0.00000	-.65077E-13	0.00000						
.23470E-01	0.00000	.46264E-15	0.00000	.56681E-13	0.00000	.90222E-14	0.00000	-.36940E-12	0.00000	.23470E-01	0.00000
.50922E-01	0.00000	.19965E-13	0.00000	.20823E-12	0.00000	.11821E-12	0.00000	-.79750E-01	0.00000	-.27101E+00	0.00000
.50922E-01	0.00000	-.40509E-13	0.00000	-.17561E-12	0.00000	.42588E-13	0.00000	-.79750E-01	0.00000	.27101E+00	0.00000
.19804E+00	0.00000	.66847E-13	0.00000	-.75264E-13	0.00000	.30705E-12	0.00000	.18383E+00	0.00000	.41681E-01	0.00000
.19804E+00	0.00000	-.16632E-13	0.00000	.10525E-12	0.00000	-.82001E-13	0.00000	.18383E+00	0.00000	-.41681E-01	0.00000
.85015E-01	0.00000	-.15799E-13	0.00000	.71562E-13	0.00000	.12758E-12	0.00000	-.10538E+00	0.00000	.27121E+00	0.00000
-.85015E-01	0.00000	-.21050E-13	0.00000	-.67020E-13	0.00000	-.11788E-12	0.00000	-.10538E+00	0.00000	-.27121E+00	0.00000
.23957E-01	0.00000	.25272E-13	0.00000	-.13640E-12	0.00000	.54469E-13	0.00000	.66426E-02	0.00000	-.22435E-01	0.00000
-.23957E-01	0.00000	.59526E-14	0.00000	.99771E-13	0.00000	-.11030E-12	0.00000	.66426E-02	0.00000	.22435E-01	0.00000

NATURAL FREQUENCY= .162354E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.86194E-01	0.00000	.21174E-13	0.00000	-.13238E-12	0.00000	-.73945E-13	0.00000	-.75896E-01	0.00000	-.87172E-01	0.00000
-.86194E-01	0.00000	.51764E-13	0.00000	.59778E-13	0.00000	-.39820E-14	0.00000	-.75896E-01	0.00000	.87172E-01	0.00000
-.15447E+00	0.00000	-.42919E-13	0.00000	.78838E-13	0.00000	-.22810E-12	0.00000	.13027E+00	0.00000	-.13766E+00	0.00000
.15447E+00	0.00000	-.43294E-13	0.00000	-.25668E-13	0.00000	.16477E-12	0.00000	.13027E+00	0.00000	.13766E+00	0.00000
-.12936E-01	0.00000	.29626E-13	0.00000	-.92686E-14	0.00000	-.65777E-13	0.00000	.18366E-02	0.00000	.37633E+00	0.00000
.12936E-01	0.00000	.46781E-13	0.00000	.38353E-13	0.00000	.17125E-12	0.00000	.18366E-02	0.00000	-.37633E+00	0.00000
.12184E+00	0.00000	.86329E-14	0.00000	.92764E-13	0.00000	-.43438E-13	0.00000	-.99490E-01	0.00000	-.41934E-01	0.00000
-.12184E+00	0.00000	-.20378E-13	0.00000	-.87031E-13	0.00000	.91820E-13	0.00000	-.99490E-01	0.00000	.41934E-01	0.00000
-.40626E-01	0.00000	.93308E-14	0.00000	-.64336E-14	0.00000	-.19193E-13	0.00000	.43274E-01	0.00000	.33905E-11	0.00000
.40626E-01	0.00000	.54332E-14	0.00000	.50958E-14	0.00000						
-.40626E-01	0.00000	.10089E-13	0.00000	-.42289E-13	0.00000						
.40626E-01	0.00000	.68525E-14	0.00000	.35032E-13	0.00000	.15077E-13	0.00000	.43274E-01	0.00000	-.33577E-11	0.00000
.12184E+00	0.00000	-.23978E-13	0.00000	.43982E-13	0.00000	-.67393E-13	0.00000	-.99490E-01	0.00000	.41934E-01	0.00000
-.12184E+00	0.00000	.38212E-13	0.00000	-.85278E-13	0.00000	-.27253E-13	0.00000	-.99490E-01	0.00000	-.41934E-01	0.00000
-.12936E-01	0.00000	-.60074E-14	0.00000	.21022E-14	0.00000	.85043E-13	0.00000	.18366E-02	0.00000	-.37633E+00	0.00000
.12936E-01	0.00000	-.35897E-13	0.00000	.30611E-13	0.00000	-.63586E-13	0.00000	.18366E-02	0.00000	.37633E+00	0.00000
-.15447E+00	0.00000	.13435E-13	0.00000	.62967E-13	0.00000	.18661E-12	0.00000	.13027E+00	0.00000	.13766E+00	0.00000
.15447E+00	0.00000	-.27203E-13	0.00000	-.73329E-13	0.00000	-.12471E-12	0.00000	.13027E+00	0.00000	-.13766E+00	0.00000
.86194E-01	0.00000	-.25042E-13	0.00000	-.11901E-12	0.00000	.56644E-13	0.00000	-.75896E-01	0.00000	.87172E-01	0.00000
-.86194E-01	0.00000	-.11636E-13	0.00000	.90092E-13	0.00000	-.79575E-13	0.00000	-.75896E-01	0.00000	-.87172E-01	0.00000

NATURAL FREQUENCY= .166916E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.40043E-13	0.00000	-.46612E-13	0.00000	.20073E+00	0.00000	.13638E+00	0.00000	-.19115E-13	0.00000	-.99012E-13	0.00000
-.30786E-13	0.00000	.13526E-15	0.00000	-.20073E+00	0.00000	-.13638E+00	0.00000	-.34604E-13	0.00000	.10205E-12	0.00000
-.16528E-12	0.00000	.56536E-13	0.00000	-.13288E+00	0.00000	.25896E+00	0.00000	.16209E-12	0.00000	.38186E-13	0.00000
.16953E-12	0.00000	.23129E-13	0.00000	.13288E+00	0.00000	-.25896E+00	0.00000	.11487E-12	0.00000	-.62349E-13	0.00000
.59273E-13	0.00000	-.67832E-14	0.00000	.88700E-01	0.00000	.20901E+00	0.00000	-.56923E-13	0.00000	.40198E-12	0.00000
-.76991E-13	0.00000	-.54901E-13	0.00000	-.88700E-01	0.00000	-.20901E+00	0.00000	-.39830E-13	0.00000	-.32243E-12	0.00000
.11763E-12	0.00000	.34978E-13	0.00000	-.22353E+00	0.00000	.47261E-01	0.00000	-.83454E-13	0.00000	-.24364E-12	0.00000
-.12112E-12	0.00000	-.37691E-14	0.00000	.22353E+00	0.00000	-.47261E-01	0.00000	-.72155E-13	0.00000	.53088E-13	0.00000
-.41123E-13	0.00000	.30791E-14	0.00000	.66986E-01	0.00000	.49591E-12	0.00000	.17460E-13	0.00000	-.41358E-13	0.00000
.19912E-13	0.00000	-.28853E-14	0.00000	-.66986E-01	0.00000						
.55294E-13	0.00000	.33310E-13	0.00000	.66986E-01	0.00000						
-.85956E-13	0.00000	-.12625E-13	0.00000	-.66986E-01	0.00000	-.49338E-12	0.00000	-.36868E-14	0.00000	.36353E-13	0.00000
.13372E-13	0.00000	-.14256E-12	0.00000	-.22353E+00	0.00000	-.47261E-01	0.00000	-.48807E-13	0.00000	-.31448E-12	0.00000
-.12272E-13	0.00000	.46285E-13	0.00000	.22353E+00	0.00000	.47261E-01	0.00000	-.42773E-13	0.00000	.47169E-12	0.00000
-.21761E-12	0.00000	-.53463E-13	0.00000	.88700E-01	0.00000	-.20901E+00	0.00000	.19663E-12	0.00000	.69948E-14	0.00000
.28016E-12	0.00000	.12707E-12	0.00000	-.88700E-01	0.00000	.20901E+00	0.00000	.18881E-12	0.00000	-.56205E-14	0.00000
.15755E-12	0.00000	-.10870E-12	0.00000	-.13288E+00	0.00000	-.25896E+00	0.00000	-.11735E-12	0.00000	.24319E-12	0.00000
-.13477E-12	0.00000	-.23317E-13	0.00000	.13288E+00	0.00000	.25896E+00	0.00000	-.11779E-12	0.00000	-.45845E-12	0.00000
-.25133E-13	0.00000	.27596E-13	0.00000	.20073E+00	0.00000	-.13638E+00	0.00000	-.62823E-14	0.00000	-.95014E-13	0.00000
-.19428E-13	0.00000	-.33187E-13	0.00000	-.20073E+00	0.00000	.13638E+00	0.00000	-.15372E-13	0.00000	.11863E-12	0.00000

NATURAL FREQUENCY= .169149E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.99159E-14	0.00000	.14813E-12	0.00000	-.18569E+00	0.00000	-.15685E+00	0.00000	.25872E-13	0.00000	-.25579E-13	0.00000
-.21773E-13	0.00000	-.21102E-13	0.00000	.18569E+00	0.00000	.15685E+00	0.00000	.29503E-15	0.00000	.57203E-14	0.00000
.43116E-13	0.00000	-.27008E-12	0.00000	.22405E+00	0.00000	-.15618E+00	0.00000	-.81386E-13	0.00000	-.75640E-14	0.00000
-.12596E-14	0.00000	-.11095E-12	0.00000	-.22405E+00	0.00000	.15618E+00	0.00000	-.21376E-13	0.00000	-.92379E-14	0.00000
-.31168E-13	0.00000	.70381E-13	0.00000	-.91327E-01	0.00000	-.98778E-02	0.00000	.32593E-13	0.00000	.22336E-14	0.00000
.58238E-13	0.00000	.32870E-12	0.00000	.91327E-01	0.00000	.98778E-02	0.00000	.26146E-13	0.00000	-.94758E-13	0.00000
.90649E-13	0.00000	-.22737E-12	0.00000	.23020E+00	0.00000	.12525E+00	0.00000	.13897E-13	0.00000	.22086E-12	0.00000
-.16003E-13	0.00000	-.47878E-13	0.00000	-.23020E+00	0.00000	-.12525E+00	0.00000	-.19505E-13	0.00000	-.14219E-12	0.00000
.29014E-13	0.00000	.64455E-13	0.00000	-.16721E+00	0.00000	.16721E+00	0.00000	-.15752E-13	0.00000	.25970E-13	0.00000
.35515E-14	0.00000	-.65627E-13	0.00000	.16721E+00	0.00000						
-.14869E-13	0.00000	.65232E-13	0.00000	.16721E+00	0.00000						
.38357E-14	0.00000	-.67545E-13	0.00000	-.16721E+00	0.00000	-.16721E+00	0.00000	-.20745E-13	0.00000	.67436E-14	0.00000
.32175E-13	0.00000	.23404E-13	0.00000	-.23020E+00	0.00000	.12525E+00	0.00000	-.55039E-13	0.00000	-.15806E-12	0.00000
-.42257E-13	0.00000	.29794E-12	0.00000	.23020E+00	0.00000	-.12525E+00	0.00000	-.43432E-13	0.00000	.63458E-13	0.00000
-.84393E-13	0.00000	-.41583E-12	0.00000	.91327E-01	0.00000	-.98778E-02	0.00000	.87420E-13	0.00000	-.46287E-13	0.00000
.75628E-13	0.00000	-.40987E-13	0.00000	-.91327E-01	0.00000	.98778E-02	0.00000	.83350E-13	0.00000	-.51360E-13	0.00000
-.10912E-12	0.00000	.12354E-12	0.00000	-.22405E+00	0.00000	-.15618E+00	0.00000	.72679E-13	0.00000	.24333E-12	0.00000
.65750E-13	0.00000	.33470E-12	0.00000	.22405E+00	0.00000	.15618E+00	0.00000	.68923E-13	0.00000	-.26040E-12	0.00000
.86317E-13	0.00000	.24437E-13	0.00000	.18569E+00	0.00000	-.15685E+00	0.00000	-.59715E-13	0.00000	.64024E-13	0.00000
-.96556E-13	0.00000	-.14656E-12	0.00000	-.18569E+00	0.00000	.15685E+00	0.00000	-.61503E-13	0.00000	-.10562E-12	0.00000

NATURAL FREQUENCY= .171962E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.64782E-13	0.00000	-.59669E-01	0.00000	.38858E-02	0.00000	-.57833E-01	0.00000	.31520E-13	0.00000	.15009E-13	0.00000
.52722E-13	0.00000	.59669E-01	0.00000	.38858E-02	0.00000	-.57833E-01	0.00000	-.16873E-13	0.00000	-.57341E-13	0.00000
.29849E-13	0.00000	.65336E-01	0.00000	.47754E-01	0.00000	.14164E+00	0.00000	-.11376E-13	0.00000	.15319E-12	0.00000
-.18122E-13	0.00000	-.65336E-01	0.00000	.47754E-01	0.00000	.14164E+00	0.00000	.19681E-14	0.00000	-.10661E-12	0.00000
.63699E-13	0.00000	.10522E+00	0.00000	.13756E-01	0.00000	.35512E+00	0.00000	-.69798E-13	0.00000	-.22015E-14	0.00000
-.58011E-13	0.00000	-.10522E+00	0.00000	.13756E-01	0.00000	.35512E+00	0.00000	-.46421E-13	0.00000	.42465E-13	0.00000
.67613E-13	0.00000	.91973E-01	0.00000	-.41698E-01	0.00000	.26157E+00	0.00000	.44205E-13	0.00000	-.13467E-12	0.00000
.29400E-13	0.00000	-.91973E-01	0.00000	-.41698E-01	0.00000	.26157E+00	0.00000	-.14060E-13	0.00000	.14062E-12	0.00000
-.42573E-13	0.00000	.30660E-12	0.00000	-.23698E-01	0.00000	.52615E-13	0.00000	.13254E-13	0.00000	-.13807E-13	0.00000
.11906E-14	0.00000	-.28101E-12	0.00000	-.23698E-01	0.00000						
.32437E-13	0.00000	.29847E-12	0.00000	-.23698E-01	0.00000						
.21121E-13	0.00000	-.28112E-12	0.00000	-.23698E-01	0.00000	-.44212E-13	0.00000	.14571E-13	0.00000	-.20054E-14	0.00000
.47963E-13	0.00000	-.91973E-01	0.00000	-.41698E-01	0.00000	-.26157E+00	0.00000	-.62105E-13	0.00000	.40815E-13	0.00000
.69389E-13	0.00000	.91973E-01	0.00000	-.41698E-01	0.00000	-.26157E+00	0.00000	-.67047E-13	0.00000	-.21827E-13	0.00000
.42131E-16	0.00000	-.10522E+00	0.00000	.13756E-01	0.00000	-.35512E+00	0.00000	-.99189E-14	0.00000	-.46995E-13	0.00000
.13397E-13	0.00000	.10522E+00	0.00000	.13756E-01	0.00000	-.35512E+00	0.00000	-.80908E-14	0.00000	.75258E-13	0.00000
.81698E-14	0.00000	-.65336E-01	0.00000	.47754E-01	0.00000	-.14164E+00	0.00000	-.65321E-14	0.00000	-.12983E-13	0.00000
.24583E-13	0.00000	.65336E-01	0.00000	.47754E-01	0.00000	-.14164E+00	0.00000	-.15401E-13	0.00000	.36498E-13	0.00000
.55465E-14	0.00000	.59669E-01	0.00000	.38858E-02	0.00000	.57833E-01	0.00000	.19206E-14	0.00000	-.11118E-13	0.00000
.32354E-13	0.00000	-.59669E-01	0.00000	.38858E-02	0.00000	.57833E-01	0.00000	-.45615E-14	0.00000	-.19541E-13	0.00000

NATURAL FREQUENCY= .16577dE+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.38537E-13	0.00000	.58657E-14	0.00000	.89227E-02	0.00000	-.55711E-01	0.00000	-.28313E-13	0.00000	-.44428E-13	0.00000
-.45087E-13	0.00000	-.76782E-14	0.00000	-.89227E-02	0.00000	.55711E-01	0.00000	-.42280E-13	0.00000	.77638E-13	0.00000
-.41879E-13	0.00000	-.15967E-13	0.00000	.13752E+00	0.00000	.21554E+00	0.00000	.31311E-13	0.00000	.84650E-14	0.00000
.35691E-13	0.00000	.15909E-14	0.00000	-.13752E+00	0.00000	-.21554E+00	0.00000	.44248E-13	0.00000	.44880E-13	0.00000
.19725E-13	0.00000	.29252E-13	0.00000	-.63270E-01	0.00000	.96220E-01	0.00000	-.46766E-14	0.00000	.18427E-13	0.00000
-.10344E-14	0.00000	.14847E-14	0.00000	.63270E-01	0.00000	-.96220E-01	0.00000	-.24896E-13	0.00000	-.36467E-14	0.00000
-.47390E-14	0.00000	-.26806E-13	0.00000	.10046E+00	0.00000	.35862E+00	0.00000	.40558E-13	0.00000	.10115E-12	0.00000
.58121E-13	0.00000	-.16419E-13	0.00000	-.10046E+00	0.00000	-.35862E+00	0.00000	.48162E-13	0.00000	-.61001E-13	0.00000
.68310E-14	0.00000	-.26216E-13	0.00000	-.18364E+00	0.00000	-.45213E-11	0.00000	.73340E-14	0.00000	.95410E-14	0.00000
-.21050E-13	0.00000	.25357E-13	0.00000	.18364E+00	0.00000						
.37958E-14	0.00000	-.75758E-14	0.00000	-.18364E+00	0.00000						
-.67262E-14	0.00000	.92741E-14	0.00000	.18364E+00	0.00000	.45018E-11	0.00000	.57232E-14	0.00000	.92630E-14	0.00000
.53124E-13	0.00000	.40584E-13	0.00000	.10046E+00	0.00000	-.35862E+00	0.00000	-.67844E-13	0.00000	-.28478E-13	0.00000
-.98647E-14	0.00000	.37091E-13	0.00000	-.10046E+00	0.00000	.35862E+00	0.00000	-.70749E-13	0.00000	.49841E-13	0.00000
-.68407E-13	0.00000	-.51149E-13	0.00000	-.63270E-01	0.00000	-.96220E-01	0.00000	.10255E-12	0.00000	.41670E-13	0.00000
.85030E-13	0.00000	-.26653E-13	0.00000	.63270E-01	0.00000	.96220E-01	0.00000	.99709E-13	0.00000	-.31362E-13	0.00000
.87428E-13	0.00000	.31750E-13	0.00000	.13752E+00	0.00000	-.21554E+00	0.00000	-.78602E-13	0.00000	.52821E-13	0.00000
-.69171E-13	0.00000	-.13616E-13	0.00000	-.13752E+00	0.00000	.21554E+00	0.00000	-.67950E-13	0.00000	-.17652E-12	0.00000
-.28295E-13	0.00000	-.44400E-14	0.00000	.89227E-02	0.00000	.55711E-01	0.00000	.27278E-13	0.00000	-.16948E-13	0.00000
-.23766E-13	0.00000	-.20596E-13	0.00000	-.89227E-02	0.00000	-.55711E-01	0.00000	.35668E-13	0.00000	.22772E-13	0.00000

NATURAL FREQUENCY= .172450E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.35762E-13	0.00000	.63788E-01	0.00000	-.55062E-02	0.00000	.60589E-01	0.00000	-.25238E-13	0.00000	-.29061E-13	0.00000
-.92346E-14	0.00000	-.63788E-01	0.00000	-.55062E-02	0.00000	.60589E-01	0.00000	.91181E-14	0.00000	.36514E-13	0.00000
-.61676E-13	0.00000	-.71894E-01	0.00000	-.51147E-01	0.00000	-.16315E+00	0.00000	.70166E-13	0.00000	-.50582E-13	0.00000
.61489E-13	0.00000	.71894E-01	0.00000	-.51147E-01	0.00000	-.16315E+00	0.00000	.29026E-13	0.00000	.32597E-13	0.00000
-.45755E-13	0.00000	-.11734E+00	0.00000	-.40370E-02	0.00000	-.37534E+00	0.00000	-.33318E-13	0.00000	.71233E-13	0.00000
.13004E-13	0.00000	.11734E+00	0.00000	-.40370E-02	0.00000	-.37534E+00	0.00000	-.49363E-13	0.00000	-.12240E-12	0.00000
.18243E-13	0.00000	-.87598E-01	0.00000	.45239E-01	0.00000	-.20271E+00	0.00000	-.61377E-14	0.00000	.51061E-13	0.00000
-.51303E-14	0.00000	.87598E-01	0.00000	.45239E-01	0.00000	-.20271E+00	0.00000	-.11771E-13	0.00000	-.18757E-13	0.00000
.17764E-13	0.00000	.49494E-01	0.00000	.11234E-02	0.00000	-.11234E-02	0.00000	-.55885E-14	0.00000	-.10933E-13	0.00000
.60560E-14	0.00000	-.49494E-01	0.00000	.11234E-02	0.00000						
.15478E-13	0.00000	.49494E-01	0.00000	-.11234E-02	0.00000						
-.31631E-13	0.00000	-.49494E-01	0.00000	-.11234E-02	0.00000	-.11234E-02	0.00000	-.21784E-13	0.00000	.16396E-13	0.00000
.21048E-15	0.00000	-.87598E-01	0.00000	-.45239E-01	0.00000	-.20271E+00	0.00000	.14708E-13	0.00000	-.70270E-13	0.00000
.33762E-13	0.00000	.87598E-01	0.00000	-.45239E-01	0.00000	-.20271E+00	0.00000	.17227E-13	0.00000	.83839E-13	0.00000
-.38021E-13	0.00000	-.11734E+00	0.00000	.40370E-02	0.00000	-.37534E+00	0.00000	.50188E-13	0.00000	.16542E-12	0.00000
.56476E-13	0.00000	.11734E+00	0.00000	.40370E-02	0.00000	-.37534E+00	0.00000	.46626E-13	0.00000	-.22145E-12	0.00000
.79325E-13	0.00000	-.71894E-01	0.00000	.51147E-01	0.00000	-.16315E+00	0.00000	-.24239E-13	0.00000	.49940E-13	0.00000
-.40167E-13	0.00000	.71894E-01	0.00000	.51147E-01	0.00000	-.16315E+00	0.00000	-.13389E-13	0.00000	-.71237E-13	0.00000
-.91163E-14	0.00000	.63788E-01	0.00000	.55062E-02	0.00000	.60589E-01	0.00000	-.15630E-13	0.00000	-.32298E-14	0.00000
-.19759E-13	0.00000	-.63789E-01	0.00000	.55062E-02	0.00000	.60589E-01	0.00000	-.51663E-14	0.00000	.64890E-13	0.00000

NATURAL FREQUENCY= .175973E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.28824E-13	0.00000	.15071E-12	0.00000	-.29782E-01	0.00000	.29396E-01	0.00000	-.10144E-13	0.00000	.16366E-13	0.00000
.11034E-13	0.00000	.12236E-12	0.00000	.29782E-01	0.00000	-.29396E-01	0.00000	.94157E-15	0.00000	-.10427E-13	0.00000
-.11922E-13	0.00000	-.35798E-12	0.00000	-.12010E+00	0.00000	-.26002E+00	0.00000	-.35084E-13	0.00000	.29461E-13	0.00000
-.18350E-13	0.00000	-.32047E-12	0.00000	.12010E+00	0.00000	.26002E+00	0.00000	-.36455E-13	0.00000	-.43854E-13	0.00000
.20318E-13	0.00000	.35986E-12	0.00000	.26706E+00	0.00000	-.58912E-01	0.00000	-.15023E-13	0.00000	-.61713E-13	0.00000
-.14101E-13	0.00000	.41408E-12	0.00000	-.26706E+00	0.00000	.58912E-01	0.00000	-.11525E-13	0.00000	.31797E-13	0.00000
-.52327E-13	0.00000	-.28245E-12	0.00000	-.53169E-01	0.00000	.29069E+00	0.00000	.12460E-13	0.00000	.38906E-13	0.00000
.92081E-14	0.00000	-.22278E-12	0.00000	.53169E-01	0.00000	-.29069E+00	0.00000	.12234E-13	0.00000	.53955E-14	0.00000
.26138E-13	0.00000	.38847E-13	0.00000	-.64007E-01	0.00000	.42400E-12	0.00000	-.30524E-13	0.00000	-.13225E-14	0.00000
.29242E-13	0.00000	.17804E-13	0.00000	.64007E-01	0.00000						
.52948E-14	0.00000	.57916E-13	0.00000	-.64007E-01	0.00000						
-.16618E-13	0.00000	.24648E-13	0.00000	.64007E-01	0.00000	-.42646E-12	0.00000	-.33151E-13	0.00000	.29351E-13	0.00000
-.40242E-14	0.00000	.82416E-13	0.00000	-.53169E-01	0.00000	-.29069E+00	0.00000	-.30146E-13	0.00000	-.11136E-12	0.00000
-.22479E-13	0.00000	.86731E-13	0.00000	.53169E-01	0.00000	.29069E+00	0.00000	-.25543E-13	0.00000	.11208E-12	0.00000
-.83078E-13	0.00000	-.14351E-12	0.00000	.26706E+00	0.00000	.58912E-01	0.00000	.87906E-13	0.00000	.48973E-13	0.00000
.64871E-13	0.00000	-.17902E-12	0.00000	-.26706E+00	0.00000	-.58912E-01	0.00000	.89387E-13	0.00000	-.68353E-13	0.00000
.42713E-13	0.00000	.12570E-12	0.00000	-.12010E+00	0.00000	.26002E+00	0.00000	-.46540E-13	0.00000	.89967E-13	0.00000
-.49212E-13	0.00000	.16167E-12	0.00000	.12010E+00	0.00000	-.26002E+00	0.00000	-.44498E-13	0.00000	-.79439E-13	0.00000
.31094E-13	0.00000	-.47538E-13	0.00000	-.29782E-01	0.00000	-.29396E-01	0.00000	.31888E-13	0.00000	-.32449E-13	0.00000
.36234E-13	0.00000	-.71520E-13	0.00000	.29782E-01	0.00000	.29396E-01	0.00000	.21771E-13	0.00000	-.16930E-13	0.00000

NATURAL FREQUENCY= .176161E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.27558E-13	0.00000	.38794E-12	0.00000	-.10676E+00	0.00000	-.93938E-01	0.00000	.74332E-13	0.00000	.39106E-13	0.00000
-.43730E-13	0.00000	.34887E-12	0.00000	.10676E+00	0.00000	.93938E-01	0.00000	.50146E-13	0.00000	.73028E-14	0.00000
.50642E-13	0.00000	-.95026E-12	0.00000	.19150E+00	0.00000	-.11318E+00	0.00000	-.63305E-13	0.00000	-.55914E-13	0.00000
-.91927E-13	0.00000	-.90862E-12	0.00000	-.19150E+00	0.00000	.11318E+00	0.00000	-.19503E-13	0.00000	.96118E-13	0.00000
-.78733E-13	0.00000	.11474E-11	0.00000	.21885E-01	0.00000	.34474E+00	0.00000	.66824E-13	0.00000	-.39964E-13	0.00000
.85691E-13	0.00000	.11847E-11	0.00000	-.21885E-01	0.00000	-.34474E+00	0.00000	.71964E-13	0.00000	.40988E-14	0.00000
.38332E-13	0.00000	-.96453E-12	0.00000	-.20542E+00	0.00000	-.67259E-01	0.00000	-.44504E-13	0.00000	.76387E-13	0.00000
-.18810E-13	0.00000	-.94232E-12	0.00000	.20542E+00	0.00000	.67259E-01	0.00000	-.77048E-13	0.00000	-.33121E-13	0.00000
-.64522E-13	0.00000	.39249E-12	0.00000	.97480E-01	0.00000	-.97480E-01	0.00000	-.13435E-13	0.00000	-.18623E-13	0.00000
.50629E-13	0.00000	.38696E-12	0.00000	-.97480E-01	0.00000						
.29910E-14	0.00000	.38272E-12	0.00000	-.97480E-01	0.00000						
-.10884E-13	0.00000	.38651E-12	0.00000	.97480E-01	0.00000	.97480E-01	0.00000	-.62331E-14	0.00000	.19747E-13	0.00000
-.76588E-14	0.00000	-.10562E-11	0.00000	.20542E+00	0.00000	-.67259E-01	0.00000	.23513E-14	0.00000	-.31173E-13	0.00000
-.38120E-14	0.00000	-.10673E-11	0.00000	-.20542E+00	0.00000	.67259E-01	0.00000	.73090E-14	0.00000	.39906E-13	0.00000
-.19065E-13	0.00000	.13360E-11	0.00000	-.21885E-01	0.00000	.34474E+00	0.00000	.16610E-13	0.00000	.45052E-13	0.00000
.10377E-13	0.00000	.13016E-11	0.00000	.21885E-01	0.00000	-.34474E+00	0.00000	.13429E-13	0.00000	.23979E-14	0.00000
.13751E-13	0.00000	-.10834E-11	0.00000	-.19150E+00	0.00000	-.11318E+00	0.00000	.39917E-13	0.00000	.22817E-13	0.00000
.15667E-13	0.00000	-.10899E-11	0.00000	.19150E+00	0.00000	.11318E+00	0.00000	.34241E-13	0.00000	-.76861E-13	0.00000
-.19155E-14	0.00000	.40772E-12	0.00000	.10676E+00	0.00000	-.93938E-01	0.00000	-.22316E-13	0.00000	-.42877E-13	0.00000
.39797E-14	0.00000	.42457E-12	0.00000	-.10676E+00	0.00000	.93938E-01	0.00000	-.17621E-13	0.00000	-.29199E-14	0.00000

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NATURAL FREQUENCY= .177482E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.11361E-15	0.00000	.97720E-01	0.00000	.35034E-12	0.00000	.27477E-12	0.00000	.15709E-13	0.00000	.11133E-13	0.00000
.14696E-13	0.00000	.97720E-01	0.00000	-.33634E-12	0.00000	-.23400E-12	0.00000	.31526E-13	0.00000	.23435E-13	0.00000
-.74329E-15	0.00000	-.25583E+00	0.00000	-.51410E-12	0.00000	.54268E-12	0.00000	-.48110E-14	0.00000	.37176E-13	0.00000
-.16461E-13	0.00000	-.25583E+00	0.00000	.49434E-12	0.00000	-.64467E-12	0.00000	-.59188E-14	0.00000	-.79344E-13	0.00000
-.75713E-14	0.00000	.31623E+00	0.00000	-.33466E-12	0.00000	-.11768E-11	0.00000	-.57276E-13	0.00000	-.13799E-13	0.00000
-.77253E-13	0.00000	.31623E+00	0.00000	.34521E-12	0.00000	.10427E-11	0.00000	-.45677E-13	0.00000	.23228E-13	0.00000
-.87278E-13	0.00000	-.25583E+00	0.00000	.84783E-12	0.00000	-.14533E-14	0.00000	.25266E-13	0.00000	-.87978E-15	0.00000
.11632E-13	0.00000	-.25583E+00	0.00000	-.83673E-12	0.00000	-.41269E-14	0.00000	.10390E-13	0.00000	-.14694E-13	0.00000
.92663E-14	0.00000	.97720E-01	0.00000	-.35180E-12	0.00000	.52653E-12	0.00000	-.47603E-14	0.00000	.65727E-14	0.00000
.29957E-14	0.00000	.97720E-01	0.00000	.33875E-12	0.00000						
-.25094E-13	0.00000	.97720E-01	0.00000	.71015E-12	0.00000						
.10186E-13	0.00000	.97720E-01	0.00000	-.71404E-12	0.00000	-.52596E-12	0.00000	-.63652E-14	0.00000	-.11412E-13	0.00000
.43543E-13	0.00000	-.25583E+00	0.00000	-.12677E-11	0.00000	.91010E-12	0.00000	-.10723E-13	0.00000	.22769E-13	0.00000
-.23902E-13	0.00000	-.25583E+00	0.00000	.12704E-11	0.00000	-.90017E-12	0.00000	-.16112E-13	0.00000	-.26459E-13	0.00000
.18930E-13	0.00000	.31623E+00	0.00000	-.35036E-12	0.00000	-.26024E-11	0.00000	-.99263E-14	0.00000	-.54375E-13	0.00000
-.40660E-13	0.00000	.31623E+00	0.00000	.35899E-12	0.00000	.25303E-11	0.00000	-.10663E-13	0.00000	.69668E-13	0.00000
-.25461E-13	0.00000	-.25583E+00	0.00000	.16282E-11	0.00000	.34440E-12	0.00000	.17370E-13	0.00000	-.82193E-14	0.00000
-.87574E-14	0.00000	-.25583E+00	0.00000	-.16123E-11	0.00000	-.35046E-12	0.00000	.14295E-13	0.00000	.79196E-14	0.00000
.22606E-13	0.00000	.97720E-01	0.00000	-.72953E-12	0.00000	.74872E-12	0.00000	-.43089E-13	0.00000	-.31574E-15	0.00000
.37076E-13	0.00000	.97720E-01	0.00000	.72987E-12	0.00000	-.74194E-12	0.00000	-.34275E-13	0.00000	-.18332E-13	0.00000

NATURAL FREQUENCY= .17563E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.16327E-13	0.00000	.61643E-12	0.00000	.42023E-01	0.00000	-.21887E-01	0.00000	.21167E-13	0.00000	.66223E-14	0.00000
-.16868E-13	0.00000	.52426E-12	0.00000	-.42023E-01	0.00000	.21887E-01	0.00000	.29836E-13	0.00000	-.31667E-13	0.00000
.44513E-13	0.00000	-.14993E-11	0.00000	.10789E+00	0.00000	.28400E+00	0.00000	-.19364E-13	0.00000	.52489E-14	0.00000
-.27459E-13	0.00000	-.13812E-11	0.00000	-.10789E+00	0.00000	-.28400E+00	0.00000	-.15561E-13	0.00000	.12403E-13	0.00000
-.26446E-13	0.00000	.15465E-11	0.00000	-.27426E+00	0.00000	.33926E-01	0.00000	-.87627E-14	0.00000	-.86138E-13	0.00000
.62073E-14	0.00000	.17649E-11	0.00000	.27426E+00	0.00000	-.33926E-01	0.00000	-.24686E-14	0.00000	.12987E-12	0.00000
-.16524E-14	0.00000	-.12110E-11	0.00000	.69997E-01	0.00000	-.27041E+00	0.00000	.94120E-14	0.00000	-.64577E-13	0.00000
.60665E-13	0.00000	-.10137E-11	0.00000	-.69997E-01	0.00000	.27041E+00	0.00000	.11538E-13	0.00000	.28337E-13	0.00000
-.17931E-13	0.00000	.65619E-13	0.00000	.26724E-01	0.00000	-.26724E-01	0.00000	-.10421E-13	0.00000	-.90932E-14	0.00000
-.20687E-14	0.00000	.92241E-14	0.00000	-.26724E-01	0.00000						
.42529E-14	0.00000	.52578E-13	0.00000	-.26724E-01	0.00000						
.31874E-13	0.00000	.12764E-13	0.00000	.26724E-01	0.00000	.26724E-01	0.00000	.78489E-14	0.00000	-.11442E-13	0.00000
.13883E-13	0.00000	.10216E-11	0.00000	-.69997E-01	0.00000	-.27041E+00	0.00000	-.14985E-13	0.00000	.38805E-13	0.00000
-.58711E-14	0.00000	.89924E-12	0.00000	.69997E-01	0.00000	.27041E+00	0.00000	-.15968E-13	0.00000	-.56560E-13	0.00000
.71982E-14	0.00000	-.14701E-11	0.00000	.27426E+00	0.00000	.33926E-01	0.00000	-.24005E-13	0.00000	-.63486E-13	0.00000
-.23142E-13	0.00000	-.14898E-11	0.00000	-.27426E+00	0.00000	-.33926E-01	0.00000	-.27339E-13	0.00000	.11051E-12	0.00000
-.21233E-13	0.00000	.13214E-11	0.00000	-.10789E+00	0.00000	.28400E+00	0.00000	.61850E-14	0.00000	-.50866E-13	0.00000
.58050E-13	0.00000	.13229E-11	0.00000	.10789E+00	0.00000	-.28400E+00	0.00000	.64976E-14	0.00000	.96851E-13	0.00000
-.17952E-13	0.00000	-.51840E-12	0.00000	-.42023E-01	0.00000	-.21887E-01	0.00000	.15331E-13	0.00000	.79219E-14	0.00000
.15053E-13	0.00000	-.51872E-12	0.00000	.42023E-01	0.00000	.21887E-01	0.00000	.20663E-13	0.00000	.22104E-13	0.00000

NATURAL FREQUENCY= .175288E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.81494E-13	0.00000	.26529E-11	0.00000	-.13115E+00	0.00000	-.11043E+00	0.00000	-.43717E-15	0.00000	.69929E-13	0.00000
.33647E-13	0.00000	.26170E-11	0.00000	.13115E+00	0.00000	.11043E+00	0.00000	-.96037E-14	0.00000	.50801E-13	0.00000
-.55177E-13	0.00000	-.66260E-11	0.00000	.21182E+00	0.00000	-.15345E+00	0.00000	-.53511E-14	0.00000	.11835E-13	0.00000
-.14982E-13	0.00000	-.65817E-11	0.00000	-.21182E+00	0.00000	.15345E+00	0.00000	.34696E-13	0.00000	-.45347E-13	0.00000
-.55682E-13	0.00000	.74664E-11	0.00000	.33248E-01	0.00000	.34817E+00	0.00000	-.95754E-13	0.00000	-.99171E-13	0.00000
-.14305E-13	0.00000	.75123E-11	0.00000	-.33248E-01	0.00000	-.34817E+00	0.00000	-.88480E-13	0.00000	.55774E-13	0.00000
-.47152E-13	0.00000	-.48402E-11	0.00000	-.16439E+00	0.00000	-.18661E-01	0.00000	.37147E-13	0.00000	.66691E-13	0.00000
.11217E-12	0.00000	-.47918E-11	0.00000	.16439E+00	0.00000	.18661E-01	0.00000	.56153E-13	0.00000	-.37714E-13	0.00000
.17398E-13	0.00000	-.11127E-12	0.00000	.50464E-01	0.00000	.60716E-12	0.00000	.18750E-13	0.00000	.22449E-13	0.00000
.75111E-14	0.00000	-.13514E-12	0.00000	-.50464E-01	0.00000						
-.74833E-14	0.00000	-.11627E-12	0.00000	.50464E-01	0.00000						
.26913E-14	0.00000	-.13491E-12	0.00000	-.50464E-01	0.00000	-.60001E-12	0.00000	.23678E-13	0.00000	.34924E-14	0.00000
.63749E-13	0.00000	.54730E-11	0.00000	-.16439E+00	0.00000	.18661E-01	0.00000	-.44803E-13	0.00000	-.12436E-13	0.00000
-.54482E-13	0.00000	.54589E-11	0.00000	.16439E+00	0.00000	-.18661E-01	0.00000	-.41134E-13	0.00000	.58191E-13	0.00000
-.72151E-13	0.00000	-.82842E-11	0.00000	.33248E-01	0.00000	-.34817E+00	0.00000	.10086E-13	0.00000	.10548E-12	0.00000
.30269E-13	0.00000	-.82911E-11	0.00000	-.33248E-01	0.00000	.34817E+00	0.00000	.13201E-13	0.00000	-.15431E-12	0.00000
.25832E-14	0.00000	.72312E-11	0.00000	.21182E+00	0.00000	.15345E+00	0.00000	.38343E-13	0.00000	.16567E-12	0.00000
.27117E-13	0.00000	.72730E-11	0.00000	-.21182E+00	0.00000	-.15345E+00	0.00000	.24458E-13	0.00000	-.14763E-12	0.00000
.95821E-13	0.00000	-.28424E-11	0.00000	-.13115E+00	0.00000	.11043E+00	0.00000	-.15202E-13	0.00000	.37318E-13	0.00000
-.90467E-13	0.00000	-.28740E-11	0.00000	.13115E+00	0.00000	-.11043E+00	0.00000	-.20633E-13	0.00000	-.14363E-13	0.00000

NATURAL FREQUENCY= .182921E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.16719E-13	0.00000	.10317E+00	0.00000	-.17593E-01	0.00000	.55701E-01	0.00000	.57644E-14	0.00000	.24368E-13	0.00000
.19294E-13	0.00000	-.10317E+00	0.00000	-.17593E-01	0.00000	.55701E-01	0.00000	-.55669E-14	0.00000	-.21194E-13	0.00000
.16441E-13	0.00000	-.18833E+00	0.00000	-.17556E-01	0.00000	-.26026E+00	0.00000	-.34911E-13	0.00000	.32229E-13	0.00000
.35309E-13	0.00000	.18833E+00	0.00000	-.17556E-01	0.00000	-.26026E+00	0.00000	-.45818E-13	0.00000	-.13802E-13	0.00000
.11147E-13	0.00000	-.52531E-01	0.00000	.57659E-01	0.00000	-.73297E-01	0.00000	.59598E-14	0.00000	-.19386E-13	0.00000
.55709E-14	0.00000	.52531E-01	0.00000	.57659E-01	0.00000	-.73297E-01	0.00000	-.49590E-14	0.00000	.19740E-13	0.00000
.52947E-13	0.00000	.20199E+00	0.00000	.44205E-02	0.00000	.28184E+00	0.00000	-.95729E-15	0.00000	.79839E-13	0.00000
.23225E-13	0.00000	-.20197E+00	0.00000	.44205E-02	0.00000	.28184E+00	0.00000	.26738E-13	0.00000	-.81227E-14	0.00000
.13457E-13	0.00000	.17945E-12	0.00000	-.26930E-01	0.00000	-.11403E-12	0.00000	-.17946E-13	0.00000	-.10685E-13	0.00000
.97371E-14	0.00000	-.20465E-12	0.00000	-.26930E-01	0.00000						
.34983E-13	0.00000	.17954E-12	0.00000	-.26930E-01	0.00000						
.98991E-14	0.00000	-.20465E-12	0.00000	-.26930E-01	0.00000	.95334E-13	0.00000	-.20051E-13	0.00000	-.11016E-13	0.00000
.27512E-13	0.00000	-.20199E+00	0.00000	.44205E-02	0.00000	-.28184E+00	0.00000	.13149E-13	0.00000	-.56601E-13	0.00000
.31941E-13	0.00000	.20199E+00	0.00000	.44205E-02	0.00000	-.28184E+00	0.00000	.14728E-13	0.00000	.57290E-13	0.00000
.19905E-13	0.00000	.52531E-01	0.00000	.57659E-01	0.00000	.73297E-01	0.00000	-.60193E-14	0.00000	.11491E-12	0.00000
.16463E-13	0.00000	-.52531E-01	0.00000	.57659E-01	0.00000	.73297E-01	0.00000	.13795E-14	0.00000	-.62168E-13	0.00000
-.18246E-13	0.00000	.18833E+00	0.00000	-.17556E-01	0.00000	.26026E+00	0.00000	.43922E-13	0.00000	.13636E-13	0.00000
.15249E-13	0.00000	-.18833E+00	0.00000	-.17556E-01	0.00000	.26026E+00	0.00000	.32716E-13	0.00000	-.37266E-13	0.00000
.26209E-13	0.00000	-.10317E+00	0.00000	-.17593E-01	0.00000	-.55701E-01	0.00000	-.33356E-13	0.00000	.33497E-13	0.00000
-.73293E-13	0.00000	.10317E+00	0.00000	-.17593E-01	0.00000	-.55701E-01	0.00000	-.33531E-13	0.00000	-.22963E-13	0.00000

NATURAL FREQUENCY= .175361E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
.14586E-13	0.00000	-.11401E+00	0.00000	-.29734E-11	0.00000	-.26070E-11	0.00000	.32858E-13	0.00000	-.24184E-14	0.00000
-.20325E-13	0.00000	-.11401E+00	0.00000	.29423E-11	0.00000	.26583E-11	0.00000	.11557E-13	0.00000	.17727E-13	0.00000
-.21844E-13	0.00000	.28868E+00	0.00000	.51513E-11	0.00000	-.29084E-11	0.00000	.83654E-14	0.00000	-.23860E-13	0.00000
-.42019E-14	0.00000	.28868E+00	0.00000	-.52362E-11	0.00000	.26425E-11	0.00000	.21873E-13	0.00000	-.22078E-14	0.00000
-.18394E-13	0.00000	-.32827E+00	0.00000	-.32073E-13	0.00000	.75447E-11	0.00000	.22752E-13	0.00000	-.52263E-13	0.00000
.16002E-13	0.00000	-.32827E+00	0.00000	.36890E-13	0.00000	-.81515E-11	0.00000	.13010E-13	0.00000	-.24131E-13	0.00000
.40531E-14	0.00000	.21426E+00	0.00000	-.32675E-11	0.00000	-.11587E-11	0.00000	-.12271E-13	0.00000	.37373E-15	0.00000
.32221E-13	0.00000	.21426E+00	0.00000	.33406E-11	0.00000	.74230E-12	0.00000	-.61752E-14	0.00000	-.10191E-13	0.00000
.30625E-13	0.00000	.31252E-12	0.00000	.10283E-11	0.00000	-.30578E-13	0.00000	-.16350E-13	0.00000	-.36468E-14	0.00000
.19862E-13	0.00000	.22196E-12	0.00000	-.10179E-11	0.00000						
.14771E-13	0.00000	.29171E-12	0.00000	.97313E-12	0.00000						
-.21332E-14	0.00000	.21744E-12	0.00000	-.96479E-12	0.00000	.13424E-13	0.00000	.25878E-13	0.00000	-.17154E-14	0.00000
.34997E-13	0.00000	-.21426E+00	0.00000	-.39608E-11	0.00000	-.10413E-11	0.00000	-.21382E-13	0.00000	-.36373E-13	0.00000
-.32395E-13	0.00000	-.21426E+00	0.00000	.38611E-11	0.00000	.70951E-12	0.00000	-.15048E-13	0.00000	-.24295E-13	0.00000
.62705E-13	0.00000	.32827E+00	0.00000	.21084E-11	0.00000	-.75539E-11	0.00000	-.45251E-13	0.00000	-.64953E-13	0.00000
-.74713E-13	0.00000	.32827E+00	0.00000	-.21216E-11	0.00000	.68719E-11	0.00000	-.42761E-13	0.00000	.52685E-13	0.00000
-.70798E-13	0.00000	-.28868E+00	0.00000	.39725E-11	0.00000	.46272E-11	0.00000	.78541E-13	0.00000	-.10043E-12	0.00000
.73928E-13	0.00000	-.28868E+00	0.00000	-.38727E-11	0.00000	-.49144E-11	0.00000	.66498E-13	0.00000	.13220E-12	0.00000
-.22496E-13	0.00000	.11401E+00	0.00000	-.30001E-11	0.00000	.22846E-11	0.00000	-.11032E-13	0.00000	.54094E-13	0.00000
-.26186E-13	0.00000	.11401E+00	0.00000	.30214E-11	0.00000	-.21795E-11	0.00000	-.22661E-13	0.00000	-.45541E-13	0.00000

NATURAL FREQUENCY= .185000E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.13515E-13	0.00000	-.10892E+00	0.00000	.17738E-01	0.00000	-.54314E-01	0.00000	.38391E-14	0.00000	-.37263E-14	0.00000
.32430E-13	0.00000	.10892E+00	0.00000	.17738E-01	0.00000	-.54314E-01	0.00000	-.15567E-13	0.00000	-.14736E-13	0.00000
.17871E-13	0.00000	.21136E+00	0.00000	.10667E-01	0.00000	.25825E+00	0.00000	-.19292E-13	0.00000	-.24717E-13	0.00000
-.32685E-14	0.00000	-.21136E+00	0.00000	.10667E-01	0.00000	.25825E+00	0.00000	.14107E-13	0.00000	-.14104E-14	0.00000
.23543E-13	0.00000	.11144E-01	0.00000	-.53255E-01	0.00000	.15730E-01	0.00000	-.24087E-13	0.00000	-.34852E-13	0.00000
-.22914E-13	0.00000	-.11144E-01	0.00000	-.53255E-01	0.00000	.15730E-01	0.00000	-.13093E-13	0.00000	.15832E-13	0.00000
.66234E-14	0.00000	-.21512E+00	0.00000	.28367E-02	0.00000	-.25525E+00	0.00000	.34648E-13	0.00000	-.33720E-13	0.00000
-.36195E-14	0.00000	.21512E+00	0.00000	.28367E-02	0.00000	-.25525E+00	0.00000	.37385E-13	0.00000	.11689E-13	0.00000
.18855E-13	0.00000	.93383E-01	0.00000	.47271E-02	0.00000	-.47271E-02	0.00000	.81766E-14	0.00000	.14894E-13	0.00000
.22219E-13	0.00000	-.93383E-01	0.00000	.47271E-02	0.00000						
-.14622E-13	0.00000	.93383E-01	0.00000	-.47271E-02	0.00000						
.28116E-13	0.00000	-.93383E-01	0.00000	-.47271E-02	0.00000	-.47271E-02	0.00000	.42258E-14	0.00000	.10635E-14	0.00000
.20963E-13	0.00000	-.21512E+00	0.00000	-.28367E-02	0.00000	-.25525E+00	0.00000	-.94637E-14	0.00000	.10487E-13	0.00000
-.12932E-13	0.00000	.21512E+00	0.00000	-.28367E-02	0.00000	-.25525E+00	0.00000	-.94174E-14	0.00000	.12860E-13	0.00000
.54915E-14	0.00000	.11144E-01	0.00000	.53255E-01	0.00000	.15730E-01	0.00000	-.26181E-14	0.00000	-.32907E-13	0.00000
-.18388E-13	0.00000	-.11144E-01	0.00000	.53255E-01	0.00000	.15730E-01	0.00000	-.65009E-14	0.00000	.34471E-13	0.00000
.73467E-14	0.00000	.21136E+00	0.00000	-.10667E-01	0.00000	.25825E+00	0.00000	.93230E-14	0.00000	.10041E-13	0.00000
-.16635E-13	0.00000	-.21136E+00	0.00000	-.10667E-01	0.00000	.25825E+00	0.00000	.74386E-14	0.00000	.39923E-14	0.00000
-.21965E-13	0.00000	-.10892E+00	0.00000	-.17738E-01	0.00000	-.54314E-01	0.00000	.13302E-13	0.00000	-.17486E-13	0.00000
.11542E-13	0.00000	.10892E+00	0.00000	-.17738E-01	0.00000	-.54314E-01	0.00000	.56145E-14	0.00000	.35459E-15	0.00000

NATURAL FREQUENCY= .20021E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.10789E-13	0.00000	.88884E-01	0.00000	-.10583E-01	0.00000	.29390E-01	0.00000	.13008E-13	0.00000	-.13136E-13	0.00000
-.12058E-13	0.00000	-.88884E-01	0.00000	-.10583E-01	0.00000	.29390E-01	0.00000	-.28729E-14	0.00000	.23805E-13	0.00000
-.16753E-13	0.00000	-.24219E+00	0.00000	.13337E-01	0.00000	-.15293E+00	0.00000	.99702E-14	0.00000	.65441E-14	0.00000
.32377E-13	0.00000	.24219E+00	0.00000	.13337E-01	0.00000	-.15293E+00	0.00000	.10299E-14	0.00000	.24168E-15	0.00000
.21043E-13	0.00000	.28072E+00	0.00000	.34567E-02	0.00000	.18141E+00	0.00000	-.17880E-13	0.00000	-.14085E-13	0.00000
-.77444E-14	0.00000	-.28072E+00	0.00000	.34567E-02	0.00000	.18141E+00	0.00000	-.32740E-13	0.00000	.69367E-15	0.00000
-.18314E-13	0.00000	-.18345E+00	0.00000	-.16341E-01	0.00000	-.11468E+00	0.00000	.11580E-13	0.00000	.15495E-13	0.00000
-.42416E-15	0.00000	.18345E+00	0.00000	-.16341E-01	0.00000	-.11468E+00	0.00000	.77027E-14	0.00000	-.72503E-14	0.00000
-.22593E-13	0.00000	-.31265E-12	0.00000	.10131E-01	0.00000	.29480E-14	0.00000	.13489E-13	0.00000	-.22995E-13	0.00000
-.57781E-14	0.00000	.31398E-12	0.00000	.10131E-01	0.00000						
.22563E-13	0.00000	-.31265E-12	0.00000	.10131E-01	0.00000						
-.15608E-13	0.00000	.31398E-12	0.00000	.10131E-01	0.00000	.28339E-14	0.00000	.13972E-13	0.00000	.85882E-14	0.00000
-.27858E-14	0.00000	.18345E+00	0.00000	-.16341E-01	0.00000	.11468E+00	0.00000	.55116E-14	0.00000	-.62483E-13	0.00000
.25481E-13	0.00000	-.18345E+00	0.00000	-.16341E-01	0.00000	.11468E+00	0.00000	.53319E-14	0.00000	.59446E-13	0.00000
-.36749E-13	0.00000	-.28072E+00	0.00000	.34567E-02	0.00000	-.18141E+00	0.00000	.22376E-13	0.00000	.41391E-13	0.00000
.40213E-13	0.00000	.28072E+00	0.00000	.34567E-02	0.00000	-.18141E+00	0.00000	.31158E-13	0.00000	-.27011E-13	0.00000
.54284E-14	0.00000	.24219E+00	0.00000	.13337E-01	0.00000	.15293E+00	0.00000	-.32943E-13	0.00000	.46375E-13	0.00000
-.20554E-13	0.00000	-.24219E+00	0.00000	.13337E-01	0.00000	.15293E+00	0.00000	-.33726E-13	0.00000	-.46259E-13	0.00000
.39820E-14	0.00000	-.88884E-01	0.00000	-.10583E-01	0.00000	-.29390E-01	0.00000	-.17746E-15	0.00000	.15031E-14	0.00000
.30697E-14	0.00000	.88884E-01	0.00000	-.10583E-01	0.00000	-.29390E-01	0.00000	.17057E-14	0.00000	.60975E-14	0.00000

NATURAL FREQUENCY= .201454E+04

TX REAL	TX IMAG	TY REAL	TY IMAG	TZ REAL	TZ IMAG	RX REAL	RX IMAG	RY REAL	RY IMAG	RZ REAL	RZ IMAG
-.20255E-13	0.00000	.79916E-01	0.00000	-.93145E-02	0.00000	.25745E-01	0.00000	.16675E-13	0.00000	-.76377E-14	0.00000
-.58994E-14	0.00000	-.79916E-01	0.00000	-.93145E-02	0.00000	.25745E-01	0.00000	.19045E-13	0.00000	-.73611E-14	0.00000
-.18938E-13	0.00000	-.22277E+00	0.00000	.12794E-01	0.00000	-.13502E+00	0.00000	-.59788E-14	0.00000	.19689E-13	0.00000
-.23324E-13	0.00000	.22277E+00	0.00000	.12794E-01	0.00000	-.13502E+00	0.00000	-.17217E-13	0.00000	-.15244E-13	0.00000
-.51597E-13	0.00000	.27648E+00	0.00000	.67816E-03	0.00000	.17199E+00	0.00000	-.25981E-13	0.00000	-.30254E-13	0.00000
-.50050E-14	0.00000	-.27648E+00	0.00000	.67816E-03	0.00000	.17199E+00	0.00000	-.17487E-13	0.00000	.23383E-13	0.00000
-.15170E-13	0.00000	-.21665E+00	0.00000	-.14383E-01	0.00000	-.12840E+00	0.00000	.23240E-14	0.00000	.28537E-13	0.00000
.37264E-13	0.00000	.21665E+00	0.00000	-.14383E-01	0.00000	-.12840E+00	0.00000	.18228E-14	0.00000	-.60827E-13	0.00000
.10441E-13	0.00000	.72045E-01	0.00000	.72504E-03	0.00000	-.72504E-03	0.00000	.73977E-14	0.00000	.72867E-14	0.00000
.39336E-14	0.00000	-.72045E-01	0.00000	.72504E-03	0.00000						
-.19272E-14	0.00000	.72045E-01	0.00000	-.72504E-03	0.00000						
.60275E-14	0.00000	-.72045E-01	0.00000	-.72504E-03	0.00000	-.72504E-03	0.00000	.81239E-14	0.00000	-.70363E-15	0.00000
-.32051E-14	0.00000	-.21665E+00	0.00000	.14383E-01	0.00000	-.12840E+00	0.00000	-.21362E-13	0.00000	-.15893E-13	0.00000
-.34924E-13	0.00000	.21665E+00	0.00000	.14383E-01	0.00000	-.12840E+00	0.00000	-.20990E-13	0.00000	.21992E-13	0.00000
-.10727E-13	0.00000	.27648E+00	0.00000	-.67816E-03	0.00000	.17199E+00	0.00000	.37269E-13	0.00000	-.15049E-13	0.00000
.13778E-13	0.00000	-.27648E+00	0.00000	-.67816E-03	0.00000	.17199E+00	0.00000	.37271E-13	0.00000	.23861E-14	0.00000
.84052E-15	0.00000	-.22277E+00	0.00000	-.12794E-01	0.00000	-.13502E+00	0.00000	-.13336E-13	0.00000	.27295E-13	0.00000
.10626E-13	0.00000	.22277E+00	0.00000	-.12794E-01	0.00000	-.13502E+00	0.00000	-.12860E-13	0.00000	-.26800E-13	0.00000
.10748E-13	0.00000	.79916E-01	0.00000	.93145E-02	0.00000	.25745E-01	0.00000	.15385E-14	0.00000	.54457E-14	0.00000
-.11607E-13	0.00000	-.79916E-01	0.00000	.93145E-02	0.00000	.25745E-01	0.00000	.21479E-14	0.00000	.13438E-13	0.00000